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# THE AMERICAN REVIEW OF TUBERCULOSIS

JOURNAL OF

THE NATIONAL TUBERCULOSIS ASSOCIATION

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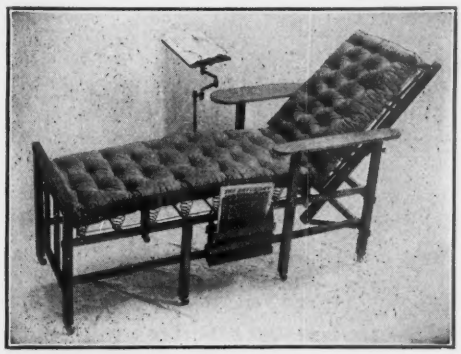

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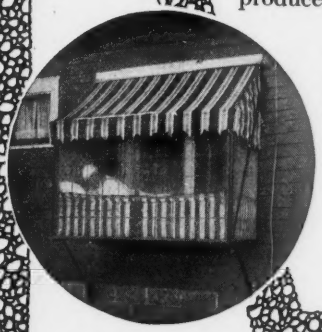

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# PRESIDENTIAL ADDRESS[1]

## THE NATIONAL TUBERCULOSIS ASSOCIATION IN TIME OF WAR

CHARLES L. MINOR

*Asheville, North Carolina*

May I seize this opportunity to tell you how very much I have appreciated the signal honor you did me at Cincinnati when you elected me to the presidency of this great Association.

Forced by necessity, as well as drawn by interest to give much thought to the disease which we are organized to fight, I have in the past twenty-five years had an excellent opportunity to become familiar with tuberculosis, and I am convinced that there is no branch of medicine, or of social service, which offers to those who devote themselves to it, so noble and so beautiful a field for their endeavors, nor a more justified cause for their interest and enthusiasm, and hence the opportunity you have given me to stand for a year at the head of this association, which was formed to study and to fight tuberculosis, in the cause of humanity and hygiene and science, is the greatest honor I can ever hope to receive.

As the world grows older, and, in the opinion of a confirmed optimist, better, more and more does altruism govern the actions of mankind, and efforts to better the condition of our fellow-men take a larger and larger place in our thought and effort, so that societies like this, whose basis is purely philanthropic, become more and more numerous. At a time when, very rightly, an organization like ours is expected to give proof of its right to exist, the public may justly ask for evidence of our usefulness to the body politic and of our right to continued support. Such questions should be welcome and we need have no shame when we look back on our fourteen years of existence and see them filled with much useful and honorable work and achievement which has redounded materially to the good of our country.

What then, are some of the activities by which we have justified ourselves and helped to work towards a solution of the great tuberculosis problem? In fighting any disease the first essential is unquestionably

[1] Delivered at the Fourteenth Annual Meeting of the National Tuberculosis Association, Boston, Mass., June 6, 1918.

education, and we find a large part of our work has been devoted to the education of the public to a rational understanding of this trouble. Our traveling exhibits and lectures have had a powerful enlightening effect wherever they have gone. Our popular handbook and other literature issued by the hundreds of thousands, have spread correct information about the disease among all who can read. Our sectional conferences, spreading interest and knowledge as to tuberculosis, have been held in various sections of the country. Moving films have brought the lessons we would teach to many who would not or could not read, while, by the organization of the modern health crusaders, we have enlisted the interest of 600,000 of our boys and girls in the battle for better conditions of living, a movement which, affecting the young, is pregnant with great possibilities when these children shall become the citizens of the next decenniums.

The effect of all these educational efforts has been enormous and I believe that they have also done something to lessen the painful tuberculophobia which earlier and alarmist teaching had cultivated in so many of the laity and in not a few of our doctors, for fear is usually the child of ignorance. If, further, we are asked for concrete and measurable results, we can point with justified pride to the great sums we have raised yearly at the holiday season by our Red Cross stamp sales which have been so very successful, which have waked up such a strong local interest in fighting tuberculosis and which have meant so much to thousands of our tuberculous poor. The popular saying has it—"money talks"; and if so, this work should go far to convince the most persistent doubter.

Again we can point with pride to the great scientific experiment, financed by a well known insurance company and guided by us, which has the whole town of Framingham, Massachusetts, as its laboratory, and thousands of American citizens as the reagents, and we can already show how much this work is doing to better conditions of living and of public health in a New England factory town, and how much light it promises to throw on many of the problems of urban tuberculosis.

Let me here seize this opportunity of expressing the sincere thanks of our association to the Metropolitan Life Insurance Company and to Dr. Lee Frankel for the broad-minded and far-seeing generosity which made this experiment possible.

Again we can show in every state of the union organizations formed through our activities, to fight tuberculosis and affiliated with the parent

association, the aggregate effect of these on the health of our country being beyond computation.

While reckoning over our achievements let us not fail to mention the invaluable influence on the study of tuberculosis, both medically and sociologically, of our annual meetings. These have become red letter occasions to all tuberculosis workers in our land. Prominent clinicians and leading social workers have been glad to head our sections, the papers read have been of a very high order of merit and our annual transactions form a valuable part of the libraries of all workers in this special line and contain not a few contributions of lasting value to the tuberculosis literature of this country and of the world.

In the past year we have gone further and have founded, under the able editorship of Dr. Baldwin and Dr. Krause, the AMERICAN REVIEW OF TUBERCULOSIS, whose great success, which my audience is familiar with, sheds lustre not only on the editorial management but on our Association and on our branch of American science.

Any one of these things would justify our existence and give us a strong claim on the active coöperation of our doctors and our social workers. Such achievements are of the greatest practical value to the country, as the most utilitarian must admit, while, on the other hand, I know of no society which makes a stronger appeal to the interest of those whom purely practical accomplishments can never fully satisfy.

Ever since our first tentative meeting in the Johns Hopkins Hospital in 1904, our Board of Directors and our Executive Committee, though composed of busy men of large interests, have never failed, even at great personal sacrifice, to give freely of their time and of their best thought t solving the many problems which have arisen and in striving for the advancement of our association and its work.

In our two Executive Secretaries, Dr. Farrand (now beneficently active in the same work in France) and his able successor, Dr. Hatfield, we have had models of what executive secretaries should be and we have been fortunate indeed in having such men to represent us before the world. I would wish to stress again the important rôle the association has played in the scientific side of the study of tuberculosis. Its decisions as regards the nomenclature and classification of this disease have been generally accepted as authoritative and its papers on the scientific side of the tuberculosis question have had an influence on the medical thought of our country which has been most beneficent. There was need of just such a clearing house of medical and sociological thought

on tuberculosis where interested clinicians and social workers could thresh out debatable questions and come to a common point of view, and, started as it was with the interest and coöperation of such men as Dr. Trudeau, Dr. Osler, and many other distinguished medical leaders, it is no wonder that it has achieved a recognized position and by rights is looked to by the medical public to take part in the decision of all questions affecting tuberculosis.

We end to-night our second septennium. Our infancy and our childhood are behind us and we are about to enter on our adolescence. Let us hope that adolescence may prove even more successful than our childhood. We have undoubtedly accomplished a great deal, but how much more could we have done had all our members realized as vividly as they might, the importance of our association, and its aims, to our country, and had they put into it more of that sanctified common sense, more of that boiling enthusiasm and energy which mark American work? No organization can stand still. We must grow or die. It is the duty of every member whether he be on the Board of Directors or not, to go out into his community and preach the duty of membership in an organization than which there is none more altruistic, none more needed, none more practically useful in our country. If all our members had so realized their duty we would have to-day the 10,000 members which we should have, and would look back upon our present enrollment of 4000 as a rather humiliating memory of early days. Let everyone who hears me to-night, then, go home determined to add at least ten new members in his or her community.

I have been as guilty as others in the past in this matter, but lately I have reformed and I can assure you that you will find member-hunting not hard, but easy, for you will be surprised how many people will gladly join if you put before them clearly the claims of our organization on their allegiance.

In the year opening before us we will have to meet problems greater than any the world has ever met before. We are in the midst of the greatest war in the world's history in which no man worth the name can stand passively by and not take his part. Civilized men, with no exceptions, save some small neutrals who dare not face the bloodthirsty brutality of the bully of the world, are united in the most idealistic task which has ever fallen to the lot of man, the task of saving the world

from the tyranny of the most brutal and unprincipled government and people which mankind has ever known.

We are fighting, as we have at last realized, for our personal safety and freedom, but we are also fighting side by side with France, Great Britain, Belgium, Italy and Serbia in order that our standards of liberty, honor and decency may not perish from the world, in order that all that is high and pure and noble may be preserved for our children and for coming generations, and that all that is base and low and materialistic may be banished from the earth. Already, there are streaming back from the western front young soldiers who in the trenches of blood-soaked and heroic France have awakened to activity the sleeping tuberculosis which they have harbored all unknown. They offered themselves, their lives and all they were to their country in her hour of need and they have a sacred claim on all Americans for help. A national association like ours would not be worthy of its name if it did not strive earnestly to meet the problems which are raised by their return and we will not deserve the confidence of our country unless we can show our ability to take an active and useful part in leading the fight to prevent an enormous increase in the morbidity and mortality of tuberculosis in our land in the next few years.

I have wished that it were in the realm of our Association's work to send to Europe a mission to help our brave Allies fight this dread disease, but work outside of our country can hardly be brought within the scope of our legitimate endeavors, and, in any case, it is fortunate that this humanitarian work has been already so ably taken up by the Red Cross and by the Rockefeller Foundation, who are meeting the demands of the situation wonderfully. It is, however, a very just cause of pride to us that in looking for experts to manage this great philanthropic task the Foundation chose for its Director our former Executive Secretary, Dr. Farrand, and the Red Cross placed at the head of its work in civilian matters our Ex-President, Homer Folks, who showed his ability by his work for our association in the past.

Further, the Rockefeller Foundation has chosen Dr. James A. Miller, long one of our most active Directors, and Dr. William Charles White as Associate Directors of the work, as well as our Vice President, Dr. Lyman, whom we all know and love, and our members, Dr. Garvin, Dr. Bailey and others, to help them carry on this great fight in France.

But, if we cannot undertake, in our own name this splendid work in Europe, there is plenty in this country to demand our best efforts, and

I cannot doubt that just as we have thought out and organized other antituberculosis measures in the past, so we can successfully plan to meet this problem. We have already planned a definite program to guide our actions under three heads: first, the question of improving the physical examination of recruits to keep out of the army tuberculous soldiers who would impair its strength, and whose trouble would probably be awakened by the strain of active military service at the front; second, the question of the care of returned tuberculous soldiers; and third, the great question of striving to keep down the inevitable war time increase of tuberculosis in our civil population.

Already the Illinois State Association under the very active leadership of Dr. Palmer is taking steps to meet these questions and has worked out a most comprehensive and excellent agreement with the Central Division of the American Red Cross and the Illinois State Department of Public Health. It strikes me as so good a model for other states that I shall take the liberty of reading it to you now.[2,3]

That you may realize how bitterly urgent is the need of such care of returned tuberculous soldiers, let me quote you from the *Illinois Arrow*, the journal of their Association, two or three pitiful instances of what is happening to such returned heroes; men who should have had an unimpeachable claim on the active sympathy and interest of any loyal American citizen or community.

A young man, the son of a clergyman, returned from France where he had been in military service. He was without funds when he reached his home community and he was found seeking aid from the overseer of the poor. Think of it, an American boy back from France, who was begging alms as a pauper! Again, a young soldier discharged from a cantonment in the South, found his home community indifferent to his needs (the more shame on them) and so he decided to have some post cards printed and go back to the outskirts of the Southern cantonment and endeavor to keep body and soul together by the sale of these cards to his former brothers-in-arms. Finally, within the dingy walls of a dis-

[2] See Appendix A.

[3] Since writing the above I find that Dr. L. B. McBrayer the very efficient superintendent of the North Carolina State Sanatorium, and Dr. Rankin of the North Carolina State Board of Health have inaugurated somewhat similar plans in North Carolina for which I here wish to give them credit. Doubtless other states may be planning such work—I certainly earnestly trust so, as it is going to take the united efforts of all of our state antituberculosis associations to meet the situation.

reputable county alms-house, an American soldier, stricken with tuberculosis, was found dying; a young Illinoisian, who had gone out to give his all while we remain safely at home, breathed his last on a pauper bed in an evil-smelling poor-house!

Can any of us with human hearts hear of such things and not blush with shame, and wish to try to help correct the situation which enabled them to be? Can this Association justify itself unless we find some way to help it?

But let us remember that as a National Association we must stand ready not merely to do our own work but to be prepared to work with our Army medical authorities to solve the problems that they are facing, —of early diagnosis, in order to exclude tuberculosis from that army; of prognosis, in order to estimate wisely the fitness of men to work in that army; and of treatment, so that after discharge those who come down with this disease may be restored to health.

If there is to be, as is so desirable, a willing and active coöperation between our Army medical authorities and the clinicians and social workers of the country and not that mutual jealousy and antagonism which a little tactlessness could so easily foster, if our Army tuberculosis workers and our civil clinicians are to accomplish good results, there must be a sincere and willing coöperation, a thing that is not always easy to attain. Medical officers are just as human as we are and would ordinarily no more appreciate than we would suggestions from outsiders even when they are experts and specialists, and they have so long managed their own affairs that advice from even the most expert is not always welcome.

Fortunately, however, in General Gorgas we have at the head of our Army medical service a man of such broad sympathies and scientific mind that such misunderstanding of the aims of our National Association seems most unlikely.

Might I here suggest that this Association should join in the movement recently inaugurated to request that the retirement of General Gorgas for age in October be postponed that our country may not lose his invaluable services.

Moreover, he has placed at the head of army tuberculosis work Colonel Bushnell, whom we all respect, and who has had wide experience in handling this disease among soldiers and who has called to his help not a few special workers in this line and is training others in the diagnostic side of the work so as to recognize the disease early.

On our part, our Association has appointed a Clinical Committee to coöperate in every way possible with the army medical tuberculosis service in the solution of Army tuberculosis problems as they arise, that there may be some official point of contact between that Army service and the clinicians and social workers of the country as represented by our Association. If, then, there can be developed a mutual coöperation and confidence between the army and the civil organization working on these special lines it should help greatly to widen our grasp and comprehension of these problems and have a beneficial effect on our mastery of this disease. The danger is, lest, on the one hand, Army discipline and the necessary respect for superior authority so essential for military efficiency and, on the other, questions of personal vanity on the part of civilians should tend to prevent such coöperation.

Implicit obedience to superior authority is of the essence of military organization without which an army would become a mob.

Absolute freedom of thought, on the other hand, is essential to medical growth, and can only temporarily be given up where absolute military necessity demands it. To combine the medical freedom, in which all doctors are trained, with that military subordination which army discipline necessitates, will call for the tact and common sense of our army men and of our clinical committee. Yet with such men as Gorgas and Bushnell at the head of the army, I do not doubt that it can and will be accomplished.

Diagnostic, prognostic and therapeutic standards can only be safely determined as the result of mutual conference between experts, and the various debatable problems which the development of tuberculosis in this war are constantly raising will need such conference.

Such questions as the amount of tuberculous involvement which would unfit a man for military service, the question as to whether any, even slightly active, tuberculosis or arrested tuberculosis would incapacitate a man from entering the army, questions of the refinements of physical diagnosis and the weight which should be laid on the various physical signs, questions of the bearing of these physical signs on the prognosis of a case, all these things raise difficult problems for us which call for solution.

Medical truths can only be developed from free and untrammelled thought, observation and medical research, and must come from a crystallization of the correlated experiences of the medical experts of the country, both military and civil. On the floors of the scientific meet-

ings of such organizations as this, where scientific freedom prevails, where mind strikes fire with mind in the great and never-ending search for truth, at the bedsides of sick men and in the laboratories of medical scientists alone, can disputed questions be settled and the truth be found.

While I recognize that the practical experience of army men in army work can alone settle certain of these questions and decide their method of procedure, it is unquestionable that, to attain the best results, there should be conference between the army medical service and the organized antituberculosis agencies of the country as represented by this association.

Prevention is greater than cure and many of our clinicians view with anxiety the tendency to draft into our army at the front tuberculous men so long as they do not show signs of active softening or of bacilli in the sputum. I cannot but fear an increase of tuberculosis in our army if an undue optimism should lead us to admit quiescent or arrested tuberculous patients into the combatant service. In the past, in the natural desire to get soldiers for the front, many men have been accepted though already tuberculous and many of these have broken down and are already a burden on the government. In future, by keeping out of our overseas army the latently or mildly tuberculous, who are sure to collapse under the strain of the battle in France, we can do something to dry up the stream at its source and protect those who have already gone. The view of this matter taken by the Army medical service may or may not be correct, but its correctness cannot be settled by an official dictum, and the accepted teaching of the last decades, founded on much careful work as to the interpretation of physical signs, the value of subjective signs and of the history, and the conditions favoring relapse, cannot be thrown away on the outbreak of the war without doing much harm to the development of the study and treatment of tuberculosis in this country in the future. We cannot be too careful to inculcate the need of painstaking examinations, and, if in the army, it is necessary to cut down such examinations to two or three minutes, the acceptance by the profession as a whole of such a practice would have a most unfortunate effect.

But, while the question of the exclusion of tuberculous men from the army and their treatment after they break down is important, the greater side of the problem after all is one that this association must be prepared to face alone without army help; and that is, the spread of tuberculosis among our civil population both from the return of tuber-

culous soldiers to their homes and from that lowering of living conditions produced by all wars which so inevitably brings with it an increase of tuberculosis. Not the best and most numerous sanatoriums or hospitals can bring back to good health all of our brave boys who have lost that priceless boon while they fought for us and humanity. Those already stricken down will be cared for by the Government and it will be as well done as is possible. But these men cannot be kept in sanatoria forever, and we must be prepared to meet the question of their care when they spread through the country and return to their homes and families, where they will too often serve as foci of infection to spread the disease.

It is for us then to attack the question of the care of our sick poor more actively than ever. Ours to watch the soldiers' families, to prevent, if possible, the development of the conditions which would favor the spread of tuberculosis among them, and to treat them when they come down with the plague. In our membership are the majority of those physicians who have devoted years to studying the tuberculosis problem medically and of those social workers who have done so much to meet the practical side of this problem in our slums. We are well prepared, therefore, to attack the problem. Let us mark our adolescence then, by an earnest and successful effort along these lines and a new drive to increase our membership in order that we may have the strength and finances to approach it as we should. Shall we let our brothers and sons fight and die in the trenches of France without lifting a hand to help them?

Can we see them returning to our shores touched with the plague and not seek for them some new Jordan in which they may wash and be clean?

I cannot believe that Americans have been so deadened by the material prosperity which has been ours so long that we will not listen gladly to the appeal of such a cause as this, nor do I think it will be difficult, if we put the claim before them rightly, to enlist at least ten thousand of our citizens in this splendid cause.

Let the leaders in this work in each state go home and organize as our Red Cross has organized, to put before our people their duty in this matter. Do not fear lest the many appeals for good causes, brought before our fellow citizens to-day, will make them deaf to your appeal. This war has already shown plainly that he who listens to the cry of the stricken has his ears opened more widely, his heart softened more than ever, to the claims of *every* suffering human being. To such a combined

work of philanthropy and science I call you to-day, not fearing lest it fall on deaf ears.

The crying need is there, the power to relieve it is in our hands, if we but show such leadership as will rally under our banner the thousands of tender-hearted, philanthropic people with whom our land is full. Let our war cry be—"Health for our brother-men."

Let us lead in a bloodless war whose aim shall be, not the conquest of new territories, not the enslavement of new peoples, but the banishing of sickness and suffering from our dear country whose reward shall be the bringing back of the color of health to pallid cheeks and of the light of hope to hopeless eyes.

## APPENDIX A

STATE OF ILLINOIS DEPARTMENT OF PUBLIC HEALTH

SPRINGFIELD

BULLETIN IX

*Care of returned tuberculous soldiers*

An important agreement relative to the care of returned tuberculous soldiers in Illinois has just been completed between the Central Division of the American Red Cross and the State Department of Public Health and the Illinois Tuberculosis Association. According to this agreement, the following procedure will be followed:

1. The names of returned tuberculous soldiers will first be sent to the Home Service Sections of the local Red Cross Chapters and the local Home Service Sections will get in touch with the soldier and will secure necessary information which will be forwarded at once to the Illinois Tuberculosis Association. You will be asked to become a member of the Home Service Section of your community.

2. Upon receiving this information, the Illinois Tuberculosis Association is obligated to get in touch with the soldier through its staff of nurses and examiners; to make an accurate diagnosis and to outline the proper method of treatment. In carrying out this part of the agreement, representatives of the Illinois Tuberculosis Association will coöperate with you, with the family physician, with the Home Service Section of the American Red Cross local chapter and with the local health officer. The examination of returned soldiers by examiners of the Illinois Tuberculosis Association will be carried out at the soldier's home town or at some central convenient point. You will be asked to assist in arranging the time and place of examination.

3. The Home Service Section of the American Red Cross will provide temporary care for the returned soldier until he has been examined and the proper line of treatment has been outlined. The Red Cross will also pay the transportation of the soldier if he is asked to go to a central point for examination.

4. After the proper treatment has been recommended by the Illinois Tuberculosis Association, the Red Cross will pay one-third of the expense of such treatment or care and will assist you in obtaining the remaining two-thirds from your county board or from other sources provided there are no public sanatoria in your county to which the patients may be sent. All parties to the agreement disapprove of housing returned tuberculous soldiers at the county almshouse either temporarily or permanently.

5. After the first investigation has been made by the Red Cross, you will be advised as to what steps are to be taken and how you and your committee can render the best assistance. In all cases, will you kindly work in harmony with the Home Service Section of your local Red Cross Chapter, with the attending physicians and with local health officers?

There are already between 600 and 700 soldiers returned to Illinois on account of tuberculosis. They are increasing in numbers daily. They must be cared for promptly and well. Many county boards have already made provision for them. The whole problem is important and the undertaking a gigantic one. Your committee has before it a real, patriotic, war-time service.

GEORGE THOMAS PALMER, M.D.,
*State Chairman.*

# TUBERCULOSIS AS AN ARMY PROBLEM

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AND
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The importance of tuberculosis in the modern army has been clearly recognized and it has seemed to us that a brief review of the tuberculosis examinations at one cantonment with criticisms of methods and suggestions for future work may prove of interest.

The number of cases of tuberculosis reported from the French army, although later largely reduced, and the occurrence of about 1 per cent of tuberculosis in the Italian army after a preliminary examination, have led many to believe that from 1 to 2 per cent of our soldiers will be returned home tuberculous. England, although her men have not suffered excessively from tuberculosis, forbids her recruiting boards from taking men "who have been under treatment in a sanatorium and men who have been notified as suffering from tuberculosis." Germany has found some patients who were treated in sanatoria to have had no tuberculosis and has called them to the colors. The great expense of transporting men to France and of maintaining them there has clearly emphasized the necessity of excluding from the ranks all men likely to succumb to disease. All these facts seem to us to indicate the necessity of a most careful study of the methods of examination of all men in our army.

## ORGANIZATION OF THE TUBERCULOSIS EXAMINING BOARD AT CAMP DEVENS

We gained our experience while serving on this board which examined 27,300 men of the first draft of the National Army. The board consisted of 19 physicians. All but two of these gave their full time to the work. The board included five specialists in pulmonary tuberculosis who served as contract surgeons. Nine officers of the Reserve Corps who served on the board had received at the Walter Reed Hospital in Washington special instructions in the method of making and reporting examinations

devised by Colonel Bushnell. Two other members of the board had had several months' experience in examining men in the National Guard and in the Officers' Training Camps. It will thus be seen that the Surgeon-General's office provided a large and well trained board for the difficult task of examining rapidly and thoroughly for tuberculosis the officers and men of the 76th Division.

Every facility for good work was provided by the Division Surgeon, Lieutenant-Colonel W. A. Powell, and thanks to his constant support the work proceeded rapidly and satisfactorily.

A special building was assigned to the board for quarters and in this was a room under the charge of a clerk where the records of the board were kept and a large assembly room which was used for special examinations and evening conferences.

The whole board was under the direction of a president who was responsible directly to the division surgeon. The rapid routine examinations were carried out by five groups of three members each called "local boards." In charge of each board was a president. Six enlisted men of the hospital corps were assigned to each board to assist in these examinations. Two did the clerical work. One of these made the typewritten reports. Two men outside the examining room instructed the men to breathe and cough in the manner prescribed, distributed history blanks and aided the men in filling them out properly. The remaining two kept the three examiners constantly supplied with men who were ushered in quietly from the outer room.

The local boards met in infirmaries, unoccupied buildings or barracks belonging to the regiment which they were examining. In spite of the interruption of the regular work caused by our examination every assistance was given by the commanding officers of regiments and companies and by the regimental surgeons to the local boards. Nominal lists according to a standard form and history sheets with mimeographed questions were prepared by each organization. Quiet was preserved in the buildings in which our examinations were held.

Each examiner was expected to examine at least fifty men a day, and we were urged to increase this number to one hundred a day if possible.

*Histories.* We were not required to take clinical histories. As each board of three members was required to examine 150 to 250 men a day, it is evident that there was no time to take regular histories. Although exemption from military service must be based on objective signs we held that it was important for our guidance to examine with special care

the men who had symptoms suggestive of pulmonary tuberculosis or who claimed to have them. A simple method of obtaining this information was employed without involving any labor on the part of the medical men.

Mimeographic copies of a questionnaire were made on sheets measuring 8½ by 11 inches on low grade paper by each organization in sufficient number to furnish one to every soldier of the command. This sheet became the record of the tuberculosis examination of each man. While waiting his turn outside the examining room each member of the quota entered the information desired upon his sheet. This gave at the top his name, organization, home address, and date of arrival at the camp. Then followed eight questions which if truthfully answered would bring to our knowledge the symptoms of pulmonary tuberculosis if they existed or a past history or a family history of that disease. Two questions to aid in recognizing heart disease concluded the list, which was signed by the soldier. One of the enlisted men attached to each board aided the soldiers in answering the questions, and sometimes secured additional information regarding the history.

A tuberculosis ward of 32 beds was established at the Base Hospital through the efforts of Colonel Powell for the observation of suspected cases of pulmonary tuberculosis and for the isolation of open cases until their discharge. This was in charge of a tuberculosis specialist stationed at the Base Hospital to whom were referred all cases of evident, or suspected phthisis discovered by our board. This important position was held for a time by Dr. Harry Lee Barnes of Wallum Lake, R. I. In addition to the official tuberculosis specialist a member of our board specially selected for his experience in the diagnosis of pulmonary tuberculosis was stationed at the Base Hospital where he examined all the cases referred by the local boards for further study. These two made the final diagnosis and decided whether a soldier with tuberculosis should be discharged or retained.

*The rapid examination.* Each man was stripped to the waist. He was taught by one of the enlisted men while outside of the examining room to stand with shoulder muscles relaxed, to breathe somewhat more deeply and rapidly than normal, and to cough at the end of expiration.

If a man answered yes to three or more of the eight questions bearing on pulmonary disease his examination was delayed until the others of the group had been examined, and examination in these cases was usually

made more carefully and leisurely. As soon as râles or abnormal breathing were detected in the rapid examination the subject was asked to step out of the line and the examination not resumed until the remainder of the group had been examined by auscultation. A man found normal on auscultation had his record sheet marked O.K. He took this to the clerk who checked his name on the nominal *check* list which was furnished by each company commander. The examination began at 8 a.m. After two or three hours of continuous work the quota of 75 to 150 men was examined and the remainder of the forenoon was devoted to the study of the "hold ups" or suspicious cases. The afternoon work which began at 1 p.m. was similar to that of the morning.

Abnormal findings were briefly recorded by the first examiner who signed his name or initials. The case was then examined by a second member of the board, usually the president, who made a short note or in case of agreement with the first examiner simply signed his initials below those of the other. These records were sent with the men to the tuberculosis specialist. The results of his examination, sputum report, X-ray findings and other data were copied on the back of the sheet which was returned to the office of the board when the case was completed.

At the close of each day the president of each local board filed a statement of the number of cases examined that day at the headquarters of the board. Once a week a summary of the work of the whole board was given to the division surgeon.

*Results.* Among the entire command of 27,304 officers and men, 184 cases of pulmonary tuberculosis were brought to light. One hundred and thirty-five of these were rejected or discharged from the army, and 48 were retained in the service. The percentage of tuberculosis found was 0.67 of 1 per cent.

All the men had been previously examined shortly after their arrival and cases suspected to be tuberculous were referred to the tuberculosis specialist, Dr. H. L. Barnes. During the three months he was at Camp Devens he discovered 304 cases of tuberculosis. Up to February 1 about 65,000 had been mustered into the service. Adding our results to those of Dr. Barnes the total of 488 is obtained and this is only 0.75 per cent of 40,000. This shows that the amount of tuberculosis in the newly assembled national army in this section of the country was not large. From this study one cannot draw any conclusions regarding the amount of tuberculosis in New England because the number of men

excluded for tuberculosis by the local exemption boards is not known. In thirty-one full working days the board examined 27,000 men.

More tuberculosis was found in the men from Boston, 2.5 per cent, than from any other section of the North Eastern States represented in the 76th Division. The distribution of the disease according to the locality from which the men came is given in the following table.

| *Locality* | *Percentage* |
|---|---|
| Boston | 2.5 |
| Rhode Island; including Providence and Pawtucket | 2.2 |
| Northern New York; including Albany and Troy | 1.7 |
| Vermont and parts of Connecticut | 1.7 |
| Maine and New Hampshire | 1.6 |
| Northeastern Massachusetts; including Lynn and Salem | 1.2 |
| Connecticut | 1.1 |
| Southeastern Massachusetts; including New Bedford and Fall River | 0.9 |

This means that more cases of tuberculosis were passed by the examiners in some cities and towns than in others, but it probably means also that the disease was more widespread in the district with the higher percentages. But of this we cannot be certain. It is hard to believe that tuberculosis is so much less common in the mill towns of New Bedford and Fall River than in Boston, Providence and Albany.

*The reliability of the history.* As is well known a reliable record of a patient's past history and present symptoms is of great value in determining the existence of pulmonary tuberculosis. Surgeons in the regular army learned in the course of long experience that little reliance could be placed on the statements concerning symptoms made by the average enlisted men in the old regular army. The men in the drafted army are different in type from the professional soldier. The national army is composed of all sorts and conditions of men. In its composition it is identical with the civilian population of the cities and towns from which it was drawn. It was to be expected, however, that the desire to escape from involuntary service would lead some men, possibly many, to make false statements in a clinical history. It was the impression of most of our examiners that a large majority of the men told the truth. The statements regarding subjective symptoms were found a distinct aid in detecting cases with objective signs. Among a series of 67 cases with evidence on physical examination, 52 had one or more subjective symptoms suggestive of phthisis.

To get facts bearing on the reliability of the statements of drafted men regarding past or present symptoms 500 records were analyzed.

Those selected were of men from southeastern Massachusetts. These were selected as a representative group of New England soldiers. Most of the men came from Fall River and New Bedford. Many had French or Irish names. None of the 500 was found on examination to present any evidence of lung disease.

TABLE 1

*Analysis of histories of 500 drafted men from southeastern Massachusetts*

37 or 7.4 per cent gave a family history of consumption.
28 or 5.6 per cent claimed to have had pleurisy.
23 or 4.6 per cent claimed to have coughed up blood or blood streaked sputum at some time.
59 or 11.8 per cent claimed to have had a cough lasting a month or more.
41 or 8.2 per cent claimed to have had night sweats.
37 or 7.4 per cent asserted they had lost weight in the six months before coming to camp.
39 or 7.8 per cent asserted they had lost weight since coming to camp.
13 or 2.6 per cent claimed they had lost strength since coming to camp.

It is clear that this group of men taken as a whole was not making false statements, as 334 out of 500, or 67 per cent answered, "No," to all the questions.

It is interesting to compare these figures with those obtained from 100 men who lived chiefly in the smaller towns of Bristol County, excluding all men from the large mill towns of Fall River and New Bedford. This list contained many English names and few foreign ones. Instead of showing fewer affirmative answers there were more to each question. The percentages in the large group ranged from 2.6 to 11.8 as shown in table 1, while in this smaller group from country districts the range was 7 to 24 per cent and only 61 per cent gave negative answers to all questions.

Men who had voluntarily enlisted would not be likely to answer these questions falsely in the affirmative, especially as chronic tuberculosis if diagnosed at the time of our examination would be considered as a disease contracted prior to entry into service, at least in most instances and hence not entitling them to a pension. They might, however, conceal symptoms from patriotic motives or possibly with the hope of securing a pension later if the disease were overlooked at the time of our examination. For these reasons the percentages of affirmative answers in this group would be expected to be less than the true number.

TABLE 2

*Analysis of history records of 500 enlisted men in a regiment of engineers*

30 or 8.0 per cent answered "Yes" to question relating to the family history.
22 or 4.4 per cent answered "Yes" to question relating to pleurisy.
22 or 4.4 per cent answered "Yes" to question relating to blood streaked sputum.
17 or 3.4 per cent answered "Yes" to question relating to night sweats.
5 or 1.0 per cent answered "Yes" to question relating to loss of weight.
404 or 81.0 per cent answered "No" to all questions.

If these percentages be accepted as less than the truth then it must follow that the percentages given in table 1 are not excessive as the difference between them and those in table 2 is small, in one instance, that dealing with blood in the sputum, amounting only to 0.2 per cent.

The volunteers were probably on the whole healthier and more vigorous than the drafted men, and the physical requirements for admission more rigid. These differences in selection could readily explain the slightly higher percentage of men with negative histories among the volunteers.

Only one drafted man among the 500 presented a history that raised suspicions of malingering in the minds of the examiners.

The records of companies comprised largely of foreigners were also examined. Many of these could speak but little English. The percentage of affirmative answers was much larger among men found on examination to have healthy lungs in this group than in the others studied.

TABLE 3[1]

*History records of 500 drafted men belonging to companies composed in large part of foreign-born who knew but little English*

94 or 18.8 per cent answered "Yes" to question relating to family history.
80 or 16.0 per cent answered "Yes" to question relating to pleurisy.
114 or 22.8 per cent answered "Yes" to question relating to blood in sputum.
119 or 23.8 per cent answered "Yes" to question relating to night sweats.
96 or 19.2 per cent answered "Yes" to question relating to loss of weight.

[1] Tables 2 and 3 were prepared by Lieutenant Eglee.

The high percentages given in table 3 shows that little reliance could be placed on their recorded statements of the group of ignorant foreigners. Many without doubt did not understand the questions, but the conclusion seems justifiable that not a few were lying with the hope that it would aid them in getting out of the military service.

*Efficiency test of the tuberculosis board examiners.* All were supposed to be skilled in the diagnosis of pulmonary tuberculosis. As already stated

the board taken as a whole was excellent. It was strengthened by the presence of several well known specialists, who served as contract surgeons. It was difficult to judge the diagnostic acumen of the individual men during the course of the examinations. They were working under five different local presidents in five different parts of the camp. Each of the fifteen medical men on these boards was examining daily about the same number of soldiers. Their task was to pick out the cases of tuberculosis by the rapid method of auscultation. All cases of suspected or undoubted disease were referred to one general disability board who made the final examination. Dr. H. L. Barnes, Dr. L. Brown, and Dr. E. R. Baldwin served on this board in succession.

As the percentage of tuberculosis was found to be only 0.62 per cent it meant that on the average one would have to examine 161 men to find a single case of tuberculosis. If 80 chests were examined every day the member of the board who found a case of tuberculosis every other day would be equalling the average record. Although the element of chance is a factor to be considered the keenest diagnosticians would be expected to discover the most cases in the long run.

The following table shows the number of cases of tuberculosis detected by each of ten members of the board in the course of examining about 15,000 soldiers.

TABLE 4

*Number of cases of tuberculosis detected by 10 examiners in the preliminary rapid examination of about 15,000 soldiers*

| | NUMBER OF CASES FOUND | | NUMBER OF CASES FOUND |
|---|---|---|---|
| A | 16 | F | 8 |
| B | 13 | G | 6 |
| C | 12 | H | 4 |
| D | 12 | I | 2 |
| E | 8 | J | 2 |

The results obtained by this test agreed remarkably well with our estimates of the diagnostic skill of the different physicians. A, C, and D were known to be excellent men. B's good showing was a surprise as he was not generally regarded as a man of special ability in tuberculosis and his experience had been slight. A and D had been specialists in tuberculosis work since they began practice. The poor showing made by I and J deserves special comment. The president of the local board on which I served reported that he feared cases were being over-

looked by I as he rarely found even a questionable case. Before entering into the reserve corps he had had little if any experience in tuberculosis work. J's work was careless and hasty. He spent less time in examining a chest than any other member of the board. He admitted frankly that he did not auscultate above the clavicles. His record of only two cases is poorer than I's because he examined many more men before his incompetency was discovered.

*The tuberculosis disability board.* When the soldier suspected of having pulmonary tuberculosis reached the Base Hospital, he was sent at once to the registrar and referred to the tuberculosis ward. After a short rest, his temperature, pulse and respiration were noted and he was again examined. This examination consisted of the usual methods of pulmonary exploration, rapid inspection for general configuration of the chest, relative height of the shoulders, localized retraction, movement of the chest, palpation, percussion (greatly interfered with by the almost constant noise) and auscultation. Owing to lack of time only abnormal conditions were noted. Before the examination a brief history was taken entirely independently of the questionnaire he brought with him from the tuberculosis board. After noting the date, name, rank, age, address, date of arrival in camp, his company and regiment, a note was made of how he looked and felt. The occurrence of family tuberculosis, of pneumonia, pleurisy, blood spitting (amount), cough, expectoration, nightsweats, loss of weight and strength, shortness of breath, recent colds, his height and usual weight (we had no scales), and finally whether or not he liked the army were noted.

The members of the local tuberculosis boards at times requested sputum and X-ray examinations. These were done and the results reported back to them, but usually the case was referred to the tuberculosis specialist for study. If the man had a suspicious history, or if the local board found abnormal physical signs which the members of the tuberculosis disability board could not confirm, or again if the disability board heard such changes, an X-ray examination was made. If the temperature or pulse was abnormal the man was held for observation in the ward and his sputum examined. Complement fixation was done in a number of cases. The sputum was supposed to be collected in the presence of one of the attendants.

Inasmuch as one of us worked on the tuberculosis disability board for only one month our statements refer to that period during which 15,000 to 20,000 men were examined by the various local boards. When

either member of the disability board detected definite signs of tuberculosis the other member was called upon to confirm or disagree with the findings. In all definite cases there was no disagreement but in some borderline cases, as was quite natural, disagreements occurred but were readily adjusted. The great value of Colonel Bushnell's instructions was manifest daily in our work and we would have been hopelessly and helplessly engaged in argument had we not possessed them. The great disparity beween the findings of the local tuberculosis boards, obtained one to three days previous to our examinations, led us to believe that many men with acute conditions were sent us.

In the first decision for retention or rejection from the army, the history obtained from the soldier was given very little weight. His physical examination was the all important factor Owing to the difficulty of obtaining sputum under surveillance, except from men in the ward, fewer sputum examinations were made than should have been done. Any man with a positive sputum could have been admitted to the ward and his sputum examined. The complement fixation was not employed extensively for it seemed impossible to obtain blood from many men for whom we should have liked it done. The radiographic study of the case was held second in importance to the physical examination. When definite physical signs were found and the radiograph was confirmatory, the man was rejected if the physical signs were those of a potentially active lesion (indeterminate râles), or if of some extent, that is, to the third rib and fourth vertebral spine. If the lesion were less extensive and without râles and the radiograph showed a parenchymatous lesion of considerable extent, the man was often rejected. That a flat plate may not reveal a slight lesion, which may lie under a rib, or separate definitely a parenchymatous from a peribronchial lesion is recognized.

Our work in camp proved once more the great necessity of a radiographic study of some 10,000 men in the evolution of radiographic changes. It is hoped that the army authorities may yet grasp the importance of this study which could be done with comparatively little expense.

To Major Davis, the roentgenologist of Camp Devens, we are deeply indebted and we desire to congratulate the army which commands the services of such a high type of man and such an earnest student.

*Râles in army examination.* The great stress laid upon the presence of râles in the army examination has led us to make a study of these adventitious sounds as detected by the board. At the very outset it was

seen that the various varieties of râles were hopelessly confused and that not only by men with little, but by men with extensive training in physical examination of the chest. To mention but one instance, many examiners found only "crepitant" râles and these occurred in many of their cases, acute or chronic. So it became apparent that the division of râles as suggested by the army authorities had been completely ignored and each man called râles other than sonorous and sibilant, crepitant or subcrepitant, fine or moderately coarse, as it seemed best to him. In this study based on 157 men referred to the disability board, we have used the following division of adventitious sounds:

1. Pleural friction.
2. Rhonchi—sonorous and sibilant râles.
3. Crepitant râles (see Circular 20).
4. Fine râles. } "Indeterminate."
5. Moderately coarse. }
6. Coarse.
7. Cavernous.

The "indeterminate" râle, as described by the Army Medical School, includes fine, moderately coarse, coarse, and rhonchi. We have employed the term to cover râles, usually moderately coarse but varying in size, heard on expiration and inspiration, resonant or non-resonant; and at times detected only after the auscultatory cough. Flint used this term "indeterminate" for another sort of râle and its confusion with "indefinite" is unfortunate. The subcrepitant râle includes the fine and some of the moderately coarse râles but others have employed this term for all râles between the crepitant and the cavernous. We make no use of this term. The "indeterminate" râle is the râle which indicates a tuberculous infiltration and bears a similar relation to the crepitant râle that the cold abscess does to the acute abscess.

Bushnell in his classical paper refers to the crepitant râle as the râle of pneumonic consolidation and advises that all men with such râles be rejected. No idea of pulmonary consolidation was entertained by many members of the board when they used this term. Among 86 men referred to the tuberculosis specialist from one board, 69 were stated to have had "crepitant" râles. Of these 86 only 24 were finally diagnosed as having pulmonary tuberculosis and of this number 3 did not fall in the group with the so-called "crepitant" râles. Of the 18 men discharged for pulmonary tuberculosis, 16 had these râles. So it is seen that only 23 per cent of the men with these "crepitant" râles

were discharged for pulmonary tuberculosis, and 65 per cent with the "crepitant" râles were non-tuberculous and apparently suffered from only an acute or subacute bronchitis. These facts prove, it seems to us, that these observers did not hear "crepitant" râles.

Of the 157 men studied in detail only 46 (29 per cent) had no râles, but 8 were rejected on account of their general and pulmonary condition. Râles were present in all in the varieties shown in the accompanying table.

| VARIETY | TOTAL NUMBER | ACCEPTED | REJECTED | SITE OF RÂLES | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Apical | | Apex or base or middle | | Basal | |
| | | | | Accepted | Rejected | Accepted | Rejected | Accepted | Rejected |
| Rhonchi | 12 | 4 | 8 | 0 | 1(?) | 2 | 5 | 2 | 2 |
| Crepitant | 4 | 1(?) | 3 | 1 | 2 | 0 | 0 | 0 | 1 |
| Fine | 28 | 21 | 7 | 10 | 4 | 3 | 1 | 8 | 2 |
| "Indeterminate" | 37 | 4(3?) | 33 | 3(2?) | 30 | 0 | 0 | 1(?) | 3 |
| Moderately coarse | 14 | 7 | 7 | 3 | 3 | 2 | 1 | 2 | 3 |
| Coarse | 8 | 5 | 3 | 0 | 0 | 0 | 1 | 5 | 2 |
| Indefinite | 8 | 5 | 3 | 3 | 2 | 2 | 0 | 0 | 1 |
| Total | 111 | 47 | 64 | 20 | 42 | 9 | 8 | 18 | 14 |

| | BASAL RÂLES | |
|---|---|---|
| | Right side | Left side |
| Fine | 4 | 5 |
| Indeterminate | 3 | 1 |
| Moderately coarse | 1 | 4 |
| Coarse | 1 | 5 |
| Indefinite | 3 | 0 |
| Total | 12 | 15 |

*Cases without râles.* Of the men without râles, 46 in number, (29 per cent of the whole), 38 (83 per cent) were accepted. Three of the eight rejected men had a parenchymatous lesion corresponding to or greater than the physical signs. One was in very poor general condition and another had spent most of his time in camp as a patient in the Base Hospital; a sixth had pleurisy; a seventh had been told he had had pulmonary tuberculosis and had dense radiographic basal shadows, while it is difficult to see why we rejected the eighth.

*Crepitant râles.* All four cases had a parenchymatous lesion. In one instance the lesion was at the apex and the crepitant râles at the base were interpreted as atalectatic. The one man of this group, who was accepted, had had no symptoms and had a normal temperature and pulse and was in good general condition, but had crepitant râles at one apex with a peribronchial lesion and a parenchymatous lesion (fine mottling) over the whole of the opposite side.

*"Indeterminate" râles.* These râles indicate usually a state of low grade inflammatory reaction and are typical of chronic pulmonary tuberculosis. They are in army work an indication for rejectlon. Four of the 37 cases with this râle were accepted. One man, an adjutant of his regiment, had a cavity at his apex, but obtained a "waiver" from the Surgeon-General's Office in Washington. He had been well for ten or twelve years and in active work during that time. A second had no radiograph taken, but had râles to the fifth rib. One of us voted for rejection. A third had had râles below the fourth rib and the third vertebral spine with coarse mottling in the seventh and eighth interspaces (posteriorly). The agreement of the physical signs and the X-ray findings led one of us to vote for his rejection. The fourth case had questionable "indeterminate" râles and only a peribronchial lesion. It should be noted that in a flat plate, it is at times impossible to separate accurately the two types of radiographic shadows.

Of the 33 men rejected, tubercle bacilli were found in 4, and were absent in 2; complement fixation was positive in 3 of 10 cases. All these men had a parenchymatous lesion but one, and here it was a question about the plate.

*Moderately coarse râles.* These râles were not heard during the short phase of respiration following cough, but were scattered through or heard in some part of inspiration. They were very different from the "indeterminate" râle. Among the 14 cases, 6 were apical, 5 basal, and 3 apical and basal.

In the diagnosis of pulmonary tuberculosis, stress has been laid on the fact that the râles must be persistent both in location and in several examinations, and again throughout one examination. Among the 6 apical cases, 2 were noted as inconstant, and put down to acute bronchitis, but neither of the two men had either at that time, or shortly before, a cold or bronchitis. One had an old pulmonary tuberculosis on the opposite side from the râles, and was accepted, and the other had râles above both clavicles and was accepted. This man one month

later broke down, had hemoptysis, tubercle bacilli in his sputum and a tuberculous pneumonia. On examination, beside the inconstant râles, he had slight tenderness to the second rib on one side (left), and possibly slight dulness to the third vertebral spine on the other (right). He had had no symptoms.

Some hold, and we believe it so, that râles at an apex, posteriorly, are more important than when heard anteriorly, but it must always be remembered that a clearing bronchitis may show râles only at one apex, posteriorly. In this group are three such cases; in 2 only a peribronchial lesion was found and the diagnosis of acute bronchitis was made. One of these was rejected; why, we cannot say. The râles cleared up on cough in his case. In the third case, which, however, had a parenchymatous lesion, a temperature of 99.6 was present, and he was rejected. The last man had apical râles, anteriorly and posteriorly, clearing on cough, but they persisted, and he had a parenchymatous lesion. He was accepted, because he looked well, and had no symptoms.

Râles at a base are usually not due to pulmonary tuberculosis. Here were 5 men, 3 of whom were rejected. One had a definite basal non-tuberculous (?) lesion; another had clubbed fingers; and the third, whom one of us voted to accept, a peribronchial lesion at the apex. The other 2 had acute bronchitis and were accepted.

Three cases had lesions at the base and higher. One with a negative X-ray was rejected against the vote of one of us. Another with râles at the base and from the second to the fourth rib was accepted, although he had a parenchymatous lesion to the third rib. The third had no X-ray and was diagnosed as having acute bronchitis.

*Coarse râles.* Seven out of 8 of these men had their râles at the base; the other over the upper half of the posterior chest and at the base also. He had coarse mottling to the fourth rib, and was rejected. One of the seven cases with râles at the base had coarse mottling at the apex and a history of having changed his residence on account of asthma. For these reasons, he was rejected. In one other case, the râles extended up to the third rib and seventh vertebral spine, and he also was rejected, although he had only a slight peribronchial lesion. We should have made certain that these râles persisted, that is, we should have reëxamined him a few weeks later, but the "90 days" were nearly up and we took a chance.

In one of these men, we noted what we had observed previously, that, after coughing for a time, râles are heard in areas where they were not

present previously. In one man, only after hard coughing could râles be detected in the third interspace, although always present in the fourth.

*Rhonchi.* The army includes rhonchi under the generic term "Indeterminate." It is of interest to study these râles, which most of us have attributed to asthmatic conditions and acute or chronic bronchitis. One man had asthma; another, an interlobar empyema; two, non-tuberculous basal disease; and all were rejected. Two men had rhonchi over the whole of one side; one with an acute cold was accepted, although he had fine mottling to the fourth rib. The other had persistent râles, no cold, and slight mottling and was rejected. Another soldier, who was found to have rhonchi over one front and was recovering from a cold, was accepted. Of two with basal râles, one had definite and fairly extensive physical signs at the right upper with mottling to the fourth rib and was rejected. In all, one-third of these privates had an old pulmonary tuberculosis, but only one, or possibly two, were rejected on this account. Hence, rhonchi rarely occurred alone in pulmonary tuberculosis.

*Fine râles.* These râles occurred without other râles in 28 men fourteen times at the apex; ten times at the base; and four times in the middle of the lung.

In 6 cases with fine apical râles, they were inconstant. One was in poor general condition, and was rejected, though duty was voted, as was done for another who had had an old but definite apical lesion. They were accepted. Among the other 8, were two rejections, one with extensive fine râles over much of the left front, with a peribronchial lesion and a silent parenchymatous lesion in the third and fourth interspaces on the right. The other was in poor general condition and had apical râles. We voted for duty for him. It is curious to note that of the remaining 6, 4 had a parenchymatous lesion, so out of 10 men with fine apical râles, 4 were rejected.

Fine râles at the base suggest the marginal sounds produced by separation of the two pleurae in the pleural sinus. The râles are of no moment, it is now held, though one of us long felt that they should suggest a more careful pulmonary exploration. Such râles were heard in 8. One with asthma and emphysema was rejected and another with what one of us took to be an inactive old apical parenchymatous lesion was also rejected against his opinion. Two more had a parenchymatous lesion; and two had pleurisy among the 6 accepted.

It must not be overlooked that we have considered only the râles and not the other abnormal physical signs which led us to rejection in some of these cases.

Four men had fine râles in the middle of the lung. All were accepted and one later had hemoptysis in camp and was rejected. He had coarse mottling to the third rib.

Indefinite râles occur in many men and we found them five times at the apex, once at the base and twice in the middle of the lung. Twice they occurred at the apex with mottling and once below the nipple with mottling from the second to the fourth rib and the three men were rejected. Slight mottling occurred in two others. So, of 8 men with indefinite râles, 3 were rejected.

The most striking fact is the high incidence of rejections among men with the "indeterminate" râle. As a matter of fact all but one whose râles were not typically "indeterminate" should have been rejected. The importance of recognizing this râle cannot be over-emphasized as it excludes men from the service. The moderately coarse, coarse, and indefinite râles were less but equally important as regards rejection. The large number of rejections among those with rhonchi was due to the fact that many of these had disqualifying, non-tuberculous, non-apical conditions. The old law that apical conditions are usually tuberculous and basal not so, seems to hold in this study. When the râles were apical two-thirds of the men were rejected; when in the middle of the lung or at the base, only one-half were rejected. In 27 men with râles only at the base, they occurred fifteen times on the left side (66 per cent) and twelve on the right. The importance of râles is shown by the fact that three times as many men with râles (58 per cent) were rejected as without râles (17 per cent).

*Disposition of the cases.* When a man came with apparently quiescent disease but definite râles, a confirmatory X-ray, normal temperature and pulse and a negative sputum, or none at all, he was allowed to return to his company until his Surgeon's Certificate of Disability (S.C.D.) came through. Owing to the crowded condition of the ward, a few men may have been returned to duty temporarily who should have remained in the ward. All men with fever or weakness were kept in the ward until discharged from the army. When the man was discharged, as far as known, no attempt was made to help him in any way at first. In one case, a man with a fever was compelled to walk and carry his bag to the station, two miles distant. This of course, was an exceptional case, and

due to some individual error. At times, there seemed to be delay in getting the S.C.D. through, due to delay usually at the Base Hospital. This, also, was no fault of the system. We feel that some social service work should be instituted to help the patients through this period and an attempt was made to interest the chaplains, which met with some success.

*Symptoms in men with pulmonary tuberculosis.* Among a series of 159 cases of pulmonary tuberculosis, the sputum was found to be positive in only 10. The temperature was rarely elevated or the pulse definitely accelerated. Analysis of the records of 67 cases showed that only 13 per cent claimed to have lost strength and only 10 per cent thought they had lost weight since coming to the camp; 22 per cent had no symptoms. It is evident from such time data that most of the cases were inactive or healed. A striking feature brought out by this study was the number of cases with signs of widespread involvement of the lungs, who had never had symptoms. It should be remembered that over 300 cases had been rejected on account of tuberculosis before we began our examinations, and most of the men had been two or three months in camp when we examined them. During the early weeks of training a large number of cases with active disease were admitted to the wards of the Base Hospital. For the most part these were instances of chronic tuberculosis that had not shown symptoms of activity until they began military training.

A widespread epidemic of influenza added to the difficulties of diagnosis at the time we made our examinations. This was chiefly characterized by a cough, which often lasted for a month or more. Many men stated that they had never had a cough previously of such long duration. In these cases fine or moderately coarse râles localized at one or both apices were common. They persisted frequently after the symptoms of influenza had disappeared.

*Errors in diagnosis due to absence of definite physical signs.* Some diagnostic mistakes are, of course, unavoidable but they deserve careful consideration in order to find means, if possible, for avoiding their repetition.

1. Lieut. A. Claimed to be feeling well. No history of loss of weight or strength. Râles present at one apex heard by two examiners. These were regarded as without significance and he was passed as normal. A few weeks later, he developed acute tuberculous pneumonia. Lesson: Any patient with apical râles should be thoroughly examined and kept

under observation. In this case, if he had been sent to the tuberculosis specialist at the Base Hospital further study might have revealed signs of disease.

2. M. Negative history. Dulness at right apex; few râles at both apices. Radiograms showed normal right apex, linear markings increased at left apex. Examined by Baldwin, Brown and Pratt independently. Not regarded as a case of tuberculosis. Within two weeks an hemoptysis occurred and tubercle bacilli were found in the sputum. Too much importance placed on the negative X-ray. Sputum examination not made until after the hemoptysis owing to difficulty of collecting satisfactory specimen, which must be obtained in presence of physicians or nurse in order to avoid deception.

3. B. Taken ill at his home with what was thought to be influenza. Gave a history of losing about 15 pounds in weight during attack. Passed. A physical examination was negative and temperature and pulse normal. Regimental surgeon struck with change in patient's appearance; recognized that he had lost much weight. He sent patient to the Base Hospital when tubercle bacilli were found in the sputum. In this case, too much dependence was placed on negative physical examination. The patient's statements in regard to loss of weight should have been confirmed by use of scales and not disregarded. Unfortunately, at the time we did our work, scales were not available.

*Some soldiers with few physical signs and few symptoms at time of examination have active disease not checked by return to quiet life.*

4. M. Answered "No" to every question on the story sheet. Later stated that he had had one drenching night sweat; no cough. He insisted that he had not lost in strength but had fallen off a few pounds in weight. Slight dulness to second rib right front. Vesicular breathing. Fine inconstant râles above both clavicles. He was returned to duty. A few weeks later slight hemoptysis; positive sputum. Discharged from army January 14, 1918. He spent the following month at his home in New Brunswick. He did not gain. He spent his time driving and walking; driving two or three hours; walking less than a mile. Afternoon fever while there for the first time. Maximum temperature, he says, was 104. He kept in bed until the temperature was nearly normal. He returned to Boston February 20. Temperature still slightly elevated in the afternoon. Average 99 for two or three days following his return. Normal weight 164 pounds. Lost 15 pounds at Camp Devens.

Physical examination: Weight, 149 pounds. Temperature, 98.9. Chest, well developed. Slight dulness to third rib right front, over right supraspinous fossa and at the top of right axilla. Apical isthmus obliterated on right side. Bronchovesicular breathing over right apex posteriorly. Granular inspiration above second rib right front. After coughing, a few medium sized moist râles heard over the right supraspinous fossa. Left lung, good resonance. Apical isthmus 3 cm. wide. Crepitant râles above left clavicle, two or three fine râles of equal size being heard with each inspiration. Possibly respiration is slightly diminished at left apex; vesicular in character.

5. O'B. Claimed to have a slight cough for two years and to have raised blood streaked sputum frequently. He had lost about 4 pounds during the ten weeks he had been in camp and 7 pounds during the six months before he came to camp. The only physical signs in the lungs were some moderately coarse râles above the left clavicle after considerable coughing. At a later examination the râles were not heard. There was dulness at the top of the left lung and diminished breath sounds. The X-ray, however, showed parenchymatous shadows to the second rib on the right side. The wisdom of rejecting him on the X-ray findings was shown by the subsequent history. During the three months following his discharge, in spite of following a fairly rigid rest treatment, he gained no weight, and ran a slightly elevated temperature.

The beneficial effect of bed-rest of short duration was well shown in the case of C. G. He gave a history of pleurisy in 1914, cough lasting for over two months and present at the time of the examination. He claimed to have lost 15 pounds since coming to camp. No loss of strength. He had fine râles to the second rib right front and posteriorly to the third vertebral spine. Temperature range in the hospital ward was 97 to 99.2: pulse 80 to 94. The X-ray plates showed evidence of infiltration to the fourth interspace on both sides. The sputum was positive. He was discharged from Camp Devens and returned to his home in Brookline, Mass. He had no money saved. Wife was working and he was living with her family. Two days after his return, the nurse of the Emmanuel Church tuberculosis class called and he began the bed-rest treatment. This was carried out indoors. He occupied a corner room, which had two windows. He was kept in bed for seven weeks, aside from making a weekly trip to the class meeting, and getting up for some of his meals. Exercise in the form of short walks was then begun. Against advice, he left the class and went to work two weeks

later. He had gained 24 pounds in the eight weeks, the physical signs had disappeared, the sputum was free from tubercle bacilli, and he felt perfectly well.

## CRITICISM AND SUGGESTIONS

1. It seemed to us that the men should be examined sooner after their arrival at camp and we have since learned that all men will in the future be examined at the Depot Brigade shortly after their arrival and before entering upon active drilling. We can readily see why this could not have been done before and once more would like to bear testimony to the efficiency of the authorities in charge of the tuberculosis examinations in the army.

2. We feel that 25 men should be sent to the examining boards every half hour, supplied with clean handkerchiefs, and, if questionnaires be used, with pencils.

3. The questionnaires are valuable in the tuberculosis examinations for several reasons: they suggest a more careful examination when questions have been answered affirmatively; they are a check upon the men examined; they save time as the man, transferred from board to board, always has his record with him; and finally they keep together all records and examinations made of each man and could be returned to the original board.

4. We cannot praise too highly Colonel Bushnell's rapid auscultatory method in tuberculosis examination in the army, and would suggest:

a. That on the rapid examination, all suspicious cases should be kept for reëxamination until the quota for the morning or afternoon be finished.

b. That since day in and day out, morning and afternoon, the most suitable number of examinations proved to be about 40 for each examiner (80 a day), this could for a time be increased to 50.

c. That fuller description of the examinations required should be furnished the examiners and should include instructions somewhat as follows:

1. Use auscultation only in first rapid examination.

2. Listen to the breathing in four or five places at least on each side, front and back, before using the auscultatory cough.

3. Use the auscultatory cough whether the breathing is normal or abnormal (Circular 20 does not make this clear).

4. Any man with râles detected by two members of the board should be referred to the tuberculosis specialist for study.

5. Attention should be called to the fact that, as Laennec has pointed out, too hard coughing obscures rather than helps the detection of râles.

5. We recommend that the entire board meet weekly with the roentgenologist and tuberculosis specialist to consider the cases referred to the tuberculosis specialist and by him accepted or rejected. At such conferences difficulties can be discussed and the workers greatly stimulated.

6. We would suggest that the examiners be urged to check up their physical examinations with the X-ray, but that they should recall that a negative X-ray, especially a flat plate, does not exclude the presence of pulmonary tuberculosis. However, such instances are of rare occurrence.

7. We would urge that a ward be set aside in the Base Hospital in each camp for the study of men suspected of pulmonary tuberculosis, and that it be equipped with scales and with a measuring rod.

8. We would recommend that the tuberculosis wards in the Base Hospital be used for instruction in the art of diagnosis of pulmonary tuberculosis of all ward surgeons and other men on the Medical Staff, as well as all regimental surgeons, who are not proficient in this work. Colonel Bushnell's efforts to teach this to selected members of the Medical Reserve Corps of the Army cannot be too highly praised.

9. Careful records of the work of each member of the board should be kept and checked up from time to time, in order to eliminate from the board careless and inefficient men.

10. The members of the tuberculosis disability board should be men who have had experience in dealing with pulmonary tuberculosis, and, if at all possible, men who have seen pulmonary tuberculosis in the army.

11. The president of the tuberculosis board should see that his assistants use the same terminology, and we recommend that as suggested by Colonel Bushnell, the differentiation of the types of râles is most important.

12. To obtain the best results, the tuberculosis board should work in harmony with the division, brigade and regimental officers, realizing the great strain under which they too labor.

13. Greater provision should be made for the future disposition of the tuberculous soldier, when he has been in camp over two months.

14. We would recall finally that even with great care certain cases will develop tuberculosis, when we least expect it.

15. We feel that more sputum examinations should be made, even when the sputum is not collected under surveillance. If positive, the man should be admitted to the Base Hospital and several sputum specimens, collected under observation, should be examined.

16. We would suggest that on each man's discharge papers be noted the reason for his discharge and if due to pulmonary disease, the location of such disease, and the fact whether or not tubercle bacilli have been found.

# THE WAR AND TUBERCULOSIS

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In one aspect of it, the war is a huge experiment. Weapons, munitions and devices fashioned during many years for the destruction of life are being tirelessly tried out, discarded, or improved upon; and military science has made greater advances in four years of war than would have been possible in twice four decades of peace. War has also put to the trial measures elaborated during many years for the saving of life. Every part of our medical and surgical armamentarium has been tested. Outworn methods, like obsolete guns, have been scrapped, and newer and better measures devised, so that in the fourth year of war we are in a fair way to reach a measure of certain knowledge we could scarcely hope to attain in almost as many generations of peace. Typhoid fever, typhus fever, tetanus, their prophylaxis and treatment, asepsis and antisepsis, wounds of all sorts and situations, surgery in all its old and new branches, poisonous gases, a whole group of new diseases; about each a new volume could be added to the fullest and surest sum of our knowledge of four years ago. War has given for the sciences of health and healing, as well as for the sciences of death-dealing and destruction, an infinite series of experiments. For those who have a special interest in tuberculosis, the war has many lessons.

It is a commonplace to repeat the old saying, verified by modern knowledge, that all of us are more or less tuberculous. Tuberculosis, as infection and inoculation, is almost universal, and tuberculosis as disease, though fortunately not universal, is lamentably common. Tuberculosis, the infection and inoculation, belongs to childhood and usually comes and goes without external signs or symptoms. The day and hour thereof knoweth no man. Tuberculosis, the disease, belongs to all ages, and has definite etiology, signs and symptoms. Tuberculosis, the disease, when it occurs in childhood, means a new infection from without by the tubercle bacillus; when it occurs in an adult it means a stirring up by debilitating conditions of an old focus already in the body. Mid-life is not a time of new infections but a time of breakdown of old centres of

disease which have remained more or less latent since childhood. It is the time of breakdown because it is the time of fullest work, of most strenuous endeavor, of overstrain, of dissipation, of spending without counting the cost.

A heavy hand has been laid upon half the youth of the civilized world, has taken them from their accustomed surroundings, occupations, and modes of life, re-clothed and re-disciplined them, crowded and overcrowded them in temporary and unsuitable barracks, exposed them to acute infections, inured them to the work of war by strenuous drill, transported them to unaccustomed climates, exposed them to all vicissitudes of weather, and finally thrown them into the chaos of modern war.

They have the good, as well as the bad in army life—open air conditions, regular hours, improvement of muscle tone through drill, on the whole good food, and, in part at least, fair living conditions. They have during the whole period, a closer medical supervision than any community of civilians.

These young men, it can be safely presumed, all carried with them into the army, at the very least their childhood inoculation of tuberculosis. In some there was a definite history, understood or not understood by themselves, of a past flare-up of more active disease which had become quiescent again, and some few brought with them into the army active and even advanced disease.

How did these millions of young men react to the war test? In the records of the recruiting offices, of barracks and camps, of battalions on active service, of hospitals and homes abroad, and of receiving depots and sanatoria at home, what can we learn from this great experiment about that universal infection, that universal inoculation, and that common disease, tuberculosis? There is no doubt but that, in the inquiry, some of our old ideas will have to be revised, some old categories expanded, some old gods destroyed.

This paper attempts to cover a part of the rapidly growing literature upon *War and Tuberculosis* and to focus some views of ally and enemy contributors; also to report from our own experience in dealing with soldiers at Manitoba Sanatorium. Of these we had, up to May 10, 1918, 327 admissions. There having been 28 readmissions, the number of individuals was 299. Of these, 91 had seen service in Canada only, 74 in Canada and England, and 134 had served in France.

When among the early casualties there began to appear hundreds and even thousands who had broken down with tuberculosis, we came to

look upon an increased incidence of tuberculosis as one of the terrific costs of war. It was just what we all might have predicted, indeed what we did predict, that large numbers would be thus broken down by the strains of war. It is true that many have thus broken down, but at the same time it seems also true that the incidence of tuberculosis among the young men of our army is not greater than the incidence among young men in civilian life at the same age period. Indeed it seems to be less, and very considerably less. Sir William Osler (1) pointed out as early as 1916 that enlisted men are less liable to develop tuberculosis than civilian stay-at-homes of the same age. Dr. J. H. Elliott (2) of Toronto argues that the tuberculosis morbidity in the Canadian army is only one-fourth of that in males of the same age period at home. A leading article in the *Lancet* (3) expressed the opinion that "camp and trench life had not been productive of more breakdowns than would have occurred in civilian employment, and a rough calculation of breakdowns from the same cause among men of military age in industrial occupations would give a vastly higher total." Schroeder (4) considers that an increase in tuberculosis was to be looked for in war, but he and other German authors report much less than was expected.

Such a conclusion is all the more welcome when contrasted with very definite increases in the tuberculosis morbidity rate and death rate in some civilian populations since the outbreak of war. An increase of terrible proportions is but to be expected in the territories over-run, especially in Belgium. Sir William Thompson (5) reports a considerable increase in Ireland. Newsholme (6) reports in England an increase in 1915 and 1916 of 12 per cent over 1913, the increase being equal in men and women. He attributes it to the general speeding up of both men and women, and general adverse conditions, due to the war, and concludes that "tuberculosis appears more rife and more fatal than prior to the war."

Of the British and Canadian armies it can safely be said that the expected increase in tuberculosis has, fortunately, not occurred; that the bad effects of war, so far as this disease is concerned, seem to have been neutralized by the good effects of mobilization; and that a young man has less chance of breakdown with tuberculosis in the army than he had in pre-war civilian life, and apparently much less in England than he would have in civilian life in time of war.

Why is it, then, that we are building more and larger sanatoria—and filling them; that the military authorities up to September, 1917, had

assisted in providing 1300 new beds in Canadian sanatoria and had already admitted for treatment 2754 soldiers suffering from, or suspected of, tuberculosis, and in March, 1918, had 1202 under treatment at one time? How can this be explained if the incidence of tuberculosis is not increased?

It may be, at least in part, because a larger proportion seek institutional treatment. Under ordinary conditions comparatively few of even active cases of tuberculosis enter sanatoria. Among mobilized men practically all active cases enter sanatoria, besides many suspects, who are really non-tuberculous. This sudden increase in our sanatorium population is not alarming if, without increasing our morbidity, we are simply increasing the proportion of our cases under institutional treatment. Indeed, that is just what for many years we have been trying to do.

## ETIOLOGY

Even if it be established that war breaks down, on an average, not more than civilian life, it can at the same time be true, and is true, that war breaks down many, some of whom would, and others probably would not, have broken down at home. What are the factors in the etiology of war tuberculosis?

A most persistent opinion to the contrary notwithstanding, the inhaling of poisonous gases has no large place in the etiology of tuberculosis, in fact scarcely has a place at all. Gas poisoning is most horrible and most deadly in its effects, but pulmonary tuberculosis is not one of those effects. In more than three hundred soldiers admitted to the Manitoba Sanatorium for treatment, of whom many had been more or less "gassed," in no case did this seem to be in any measure responsible for the disease. In two or three in whom after-effects of gas were marked, tuberculosis could not be diagnosed. Elliott and Tovell (7), among fifty cases of fairly definite "gassing," found only four in which a relation to tuberculosis could be even suspected. Kindberg and Delherm (8), in 1000 French soldiers suspected of tuberculosis, found only two who considered their illness due to asphyxiating gases, and in only one of the cases did there seem to be any foundation for the belief. Two other French authors report only three cases among 1206 soldiers suffering from tuberculosis, in which gas was suspected of having been the cause. Having been "gassed" therefore, does not seem to lead to tuberculosis.

It is also a fixed idea with the general public that infection from more advanced cases who have slipped into the army, is a source of fresh disease. There is no evidence that this is the case. He who carries active disease back from the war presumably carried latent disease with him to the war. In the treatment of a large number of tuberculous soldiers Schroeder (4) did not encounter one case in which he considered primary disease due to infection on active service. He considered this observation confirmed by post mortem examination made by Monckeberg on soldiers who died of tuberculosis,which showed in all cases apparent spread of new disease from an old focus.

This is a point at which definitions are very important. While new disease where no focus existed before cannot, we believe, be charged to the war, and presumably does not occur in adult life, new activity where there was no history of activity before has been undoubtedly stirred up by war. Some carried to the war old foci of disease, which had already given definite trouble, and some—but not all—of these brought back newly activated disease. The majority of those who came back with active disease, however, can give no history of former activity, and presumably carried over with them only a childhood implantation. Of 299 soldiers treated at Ninette, a preënlistment history of active disease was considered positive in 17 per cent, presumed in 8 per cent, suspected in 13 per cent. That is, it was positive, presumed or suspected in 38 per cent, while no evidence of preënlistment activity was found in 62 per cent. At the same time, even in the 62 per cent in whom evidence of preënlistment activity could not be made out, nothing in the history could be found to raise any suspicion of army infection, but rather pointed to the stirring up by war conditions of an unknown preënlistment focus.

Trauma has not been a large factor in the causation of tuberculosis. Schroeder (4) reports having found no tuberculosis of bones or joints due to trauma, and in his experience tuberculosis has seldom followed gunshot wound of the lung. This is said to have been exceedingly rare also in the Franco-Prussian war. Seeing at Ninette only the cases of trauma in which there is also tuberculosis we cannot draw general conclusions. In our series of four gunshot wounds of the lung, in one only did this appear to have been the cause of pulmonary tuberculosis. While trauma may not have led directly to tuberculosis any injury which has greatly lowered vitality, as for instance, one in which there has been long-continued suppuration, has undoubtedly encouraged tuberculous

activity. A wound of the jaw reported by Grau (9) which made eating difficult and so interfered with nutrition, can be easily understood to have been an actual cause of tuberculosis and in the same class could be placed chest injuries.

Mention has been made of immunizing inoculations as in some cases leading to tuberculosis. We have found in our own series two or three who considered that active signs of tuberculosis followed anti-typhoid inoculation. Schroeder (4), who reports several such cases, supposes that, "the intensive work of the cells, in creating protective substances for other diseases, may leave an anergic state for tuberculosis" and points out that a like condition of anergy or lowered resistance to tuberculosis, is found after measles, pertussis and typhoid fever.

Among the very definite causes of tuberculosis are physical overstrain; the over-drilling of soft men in the great haste to make them fit for war; unwise "hardening" processes employed by some young, energetic and inexperienced officers; the fatigue and exhaustion of supreme efforts; the long-continued grind of trench work; long marches with full kit; insufficient and irregular feeding in the exigencies of active service; intestinal disorders due to unsuitable foods; nervous exhaustion after high excitement; and imprisonment with all its debilitating conditions, including semi-starvation. Bad conditions in barracks which were over-crowded, over-heated, under-heated, irregularly heated, draughty, dusty or damp, impressed the men themselves as likely causes of their illness, especially in the period of most active mobilization. Wet and cold and chill in camps both in Canada and England are mentioned most often as the beginnings of trouble. Parades in cold November weather, violent storms in camp, the change in amount and kind of clothing from what was habitual, all these have seemed important elements.

For many years I have been inclined to give a place in the etiology of tuberculosis to emigration. Changes in climate, humidity, temperature, weather, altitude, and in water, food, work, housing, and general surroundings in a new country make up a grand total of sudden change which definitely lowers resistance until the immigrant becomes acclimatized. "The first year out" is a not uncommon time of breakdown. In the same way, and for the same reasons, England, and particularly camp life in England, even apart from the notorious Salisbury Plain, seems to have definitely and adversely affected the resistance of Canadian soldiers to tuberculosis. This seems to have been true, not only of native Canadians in England for the first time, but equally true of men of English

birth returning after years of residence in Canada. The unanimity with which men spoke of immediate improvement on return to Canada strongly suggests accustomed climatic conditions as at least one of the benefits of return home.

But the chief element in the etiology of army tuberculosis has undoubtedly been acute infections, especially infections of the upper respiratory tract. Men gathered from all parts of the country into crowded barracks were all exposed to the infections each brought. Measles, pertussis, scarlet fever, mumps, diphtheria, tonsilitis infected their thousands; but influenzas of all sorts, catarrhs of every variety, common colds and uncommon colds, familiar forms and trench forms of bronchitis infected their tens of thousands. They were universal in barracks, camp and trench. The whole army coughed. And these "colds" undoubtedly in many cases were but the prelude to the larger play. Elliott (10) considers that whatever is done to lessen the acute respiratory infections in barracks and camp will to the same extent lessen the incidence of tuberculosis, and with that opinion every man who treats tuberculosis, especially among soldiers, will undoubtedly agree.

## DIAGNOSIS

It may seem strange to state that the diagnosis of tuberculosis has been made more difficult by war, but that is very true—and for many reasons. Under voluntary enlistment there was a tendency among men anxious to serve to conceal their disease. Others, by no means anxious to serve, but knowing they were diseased, slipped into the army in order to be taken care of; while, in the first rush of enlistment, with competition between battalions for recruits, with examinations made in noisy offices, it was impossible that suspects among apparently healthy men should be at all effectively weeded out. Of the 299 soldiers treated by us at Ninette, 201 of whom were considered tuberculous and 34 of whom were considered to have had positive signs of tuberculosis before enlistment, at least 20 must have been grossly unfit at the time of enlisting and should have been rejected, even on a merely casual examination.

Under a system of compulsory service another set of difficulties arise. Men unwilling to serve have made the most of slight doubtful signs and symptoms in order to secure exemption.

There was the added difficulty in all the allied countries, except, perhaps, the United States, of extreme haste in mobilizing. In France a

nation had to spring to arms over night; in England, and the Dominion overseas, in weeks. In the United States the haste was not so great, and the sifting could be more carefully done. After the men of the American army had been examined and reëxamined, a third examination by chest experts threw out approximately 1 per cent. The saving to the army of a diagnosis of tuberculosis made in time is estimated at $5,000 per man. In the much less carefully examined Canadian army, such a final sifting out of chest cases would have saved the country at least $5,000,000.

The period of mobilization presents another peculiar difficulty. Tuberculosis inoculation being almost universal, latent disease common, and more or less arrested disease also common, theoretically, all may be said to be more or less tuberculous. Where then should the line be drawn between those who ought and those who ought not to have exemption from service in time of war? Who should be declared for the purposes of mobilization tuberculous and who non-tuberculous?

Diagnosis in the soldier on active service or returning from the war is a matter of still greater difficulty. Even the keenest and best soldiers reach after a time a "fed up" stage, in which they are not unwilling to have some pulmonary affection carry them as far back toward Canada and their own firesides as possible. They have even been known to assist in the diagnosis by various means. On the strictly scientific side, the differential diagnosis between tuberculosis and the many old and new acute infections of the respiratory tract arising in active service is exceedingly difficult, sometimes impossible.

There is still an added difficulty in the case of the Canadian soldier in that he is constantly on the move. He may have his onset of disease in France, pass through an acute stage in England, and reach Canada well on in his convalescence. In the meantime he may have been under the care of a half dozen different medical officers, in a half dozen different homes, hospitals and sanatoriums. When he presents himself for examination in Canada the advanced case is still an advanced case, or the frank negative is still negative. But the man whose flare-up of active tuberculosis, or other ailment, was slight and short-lived, and occurred anywhere between three and fifteen months ago presents a most difficult problem in diagnosis. It is much like making a first examination of a sanatorium patient at the time of discharge, or the year after discharge, rather than at the time of admission. A very poor record or no record of the rather far-distant acute and brief diagnosable stage may be avail-

able. The question as to need of further treatment, or, on the other hand, fitness for discharge, is comparatively easy to decide; but the diagnosis, before the basis of a man's discharge can be properly established, must be changed from that of "tuberculosis suspect," given him possibly within hearing of the enemy's guns and unchanged since, to either a definite positive or definite negative. The pension board very rightly estimates the disability of a man who has a definite attack of pulmonary tuberculosis higher than that of one whose sinuses have been temporarily troublesome. As can be easily seen, a most intricate diagnostic problem, and one upon which much depends, is raised by the military tuberculosis suspect.

As has been shown, the diagnosis of pulmonary tuberculosis has been made more difficult by war. But in any case, the pendulum was already swinging toward greater conservatism in diagnosis. Indeed we have come into a stage almost of skepticism. Twenty years ago the diagnosis of tuberculosis was made very conservatively; five years ago much more freely; and now again conservatively. When the almost universal spread of the disease became one of our modes of thought we were inclined to suspect tuberculosis in almost every pulmonary ailment not absolutely typical of some other disease condition. The onus of proof was on him who would negative the diagnosis of tuberculosis, not on him who would make it. Now we are beginning to demand that he who makes the diagnosis must adduce the proof. The swing of the pendulum toward conservatism has been speeded up by the use of the X-ray plate. An attitude of skepticism is very soon reached by one who has much to do with differential diagnosis in the numerous military class known as "tuberculosis suspects."

There is no doubt that the medical officers of all our armies were, to a certain extent, stampeded by tuberculosis, especially in the first year of the war. The first rush to arms in France carried many a case of open active tuberculosis into the army. They were soon weeded out, but the weeding out did not stop with them. The whole army was under suspicion. In December, 1915, after a little more than a year of war, Professor Landouzy announced that already 86,000 men had been discharged from the French army on account of tuberculosis. Hermann Biggs (11), with this fact as a text, sought to rouse the American people to a proper sense of danger. Then came Major Rist of the French army to tell us that of the 86,000, there were, when diagnosis was better made, only one-fifth positively tuberculous. The French army, as Bushnell (12)

says, lost the services of two divisions of men at a time of urgent need, simply on account of wrong diagnosis.

While "stampede" was by no means so great in the Canadian army, yet a fairly high percentage of the men sent back to Canada as tuberculous, or as tuberculosis suspects, has been found definitely non-tuberculous. Of the soldiers returned to M. D. 10 and sent to the Sanatorium at Ninette, nearly 28 per cent were put down as negative and 5 per cent as doubtful. The percentage of negatives and doubtfuls has steadily risen from 12 per cent in the first fifty cases to 50 per cent in the last fifty admitted. Of those who had not gone overseas, there were 22 per cent non-tuberculous or doubtful; of those who had gone only to England 35 per cent, and of those who had served in France 38 per cent negative or doubtful. Among German tuberculosis suspects Tachau (13) states that Fraenkel found 60 per cent, De la Camp 30 per cent, and Blimel 80 per cent non-tuberculous. Truly broad is that gate marked "tuberculosis suspect" and many there be which go in thereat.

It has already been stated, that of the 86,000 sent back from the French army in the first year of the war as being tuberculous, 80 per cent were considered on fuller examination to be non-tuberculous. This fuller examination, which checked the rout, was carried out by Major Rist and his associates in specially equipped centres in the supply area. These *centres de triage* are centres not of treatment, but of diagnosis, are in charge of men of wide experience in tuberculosis, and aim to bring the means of careful and complete diagnosis up almost to the firing line. That is clearly the point at which diagnosis is of greatest value. A suspect who proves negative can be sent back to duty with little loss of time, whereas, when he passes far down the line as a suspect, he gains momentum. After he has reached England as a suspect there is not much chance of return to active service, and when returned to Canada as a suspect, however slight or even negative the findings may be, he is definitely lost to the army. The French "centres" have the means of taking a full history, an elaborate X-ray equipment, a well-fitted laboratory, —a matter of very great importance,—have also a nose and throat department. Such centres are now found behind every French Army. The attitude of Major Rist is possibly a little too skeptical. He insists upon either bacilli being found or X-ray findings that cannot be doubted. He neglects no means by which tubercle bacilli may be demonstrated, even using potassium iodide to increase secretion.

It is well established, then, that there is among soldiers besides true tuberculosis, a "false tuberculosis" (which is, of course, not tuberculosis at all) and that the false may at times outnumber the true. What, it may be asked are those negative cases? What do they look like? What are their signs and symptoms? How can we know them? When we are successful enough to take off the tuberculosis mask in which it is parading, what do we find "false tuberculosis" really is?

We cannot do better, to begin with, than follow Kindberg and Delherm (8) in their account of 1000 cases dealt with in one of the French diagnosis centres, or the discussions of Major Rist (14) with regard to this work and results.

Of the thousand suspects 193 or nearly 20 per cent were classed as positively tuberculous, 80 per cent or 807 as non-tuberculous.

Of the negatives the largest single class were the cases in which pathological conditions of nose, throat and sinuses produced symptoms simulating those of pulmonary tuberculosis. Some of these are enumerated by Rist as "chronic maxillary sinusitis, chronic purulent discharges from the ethmoidal cavities, hypertrophied turbinate bones, atrophic rhinitis, adenoids, deflected nasal septum, etc." All these chronic nasal conditions, he adds, have one symptom in common—cough. Why should we, he asks, presume every respiratory ailment or symptom due to a focus in the lung? Might we not as reasonably presume all urinary symptoms due to kidney lesions, without even examining bladder or urethra. There is no doubt that nose and throat conditions account for a distinct type, or even several distinct types, of non-tuberculous cases. We have had in our series a fair proportion of cases in which signs and symptoms usually associated with pulmonary tuberculosis were undoubtedly due to conditions above the clavicle. In a typical case of this sort there were wide spread and rather coarse râles in the lower halves of both lungs. profuse expectoration, with no bacilli, and the condition was unchanged by months of the ordinary routine of the sanatorium. Examinations revealed sinuses "brimming with pus." After operation signs and symptoms cleared up completely and quickly. As Rist says, "A phantom tuberculosis which may have lasted many years will be cured by such a simple and harmless procedure as the removal of a turbinate bone or of hypertrophied adenoids or by the curetting of an antrum."

Kindberg and Delherm (8) class their non-tuberculous cases as, first, plainly negative, second, doubtful. In the plainly negative class are those with general bronchitis, tending to chronic bronchitis and emphy-

sema in older men, and in younger men, to acute bronchitis. They include also among the "plainly negative" certain cases of pleurisy about which some question might easily be raised, cardiac cases, and a number whose symptoms of weakness, loss of weight and general bad condition were due to dental insufficiency.

Among their really doubtful cases are those in which clinical signs suggest an apical lesion with slight râles, slight elevation of temperature, bronchitis and cough, but with a negative X-ray picture. A second type gives a rather clouded and suggestive X-ray picture, but is clinically negative. A third doubtful type shows some association of clinical and X-ray signs. They point out that since most of the men dealt with suffered from debility, breakdown and overstrain, such classical symptoms as loss of weight, fatigue, and even fever, did not have their usual diagnostic significance.

Elliott (10) has found, as we all have among the tuberculosis suspects, pulmonary non-tuberculous conditions such as asthma, bronchitis, emphysema and bronchitis, convalescent pleurisies and empyemas with collapsed lung and gun shot wounds of the chest followed by haemothorax or empyema, with resultant collapse of lung. To these can be added bronchiectasis and pulmonary abscess. Among cases of more doubtful diagnosis, but still negative, he considers the commonest conditions to be debility, loss of weight, tachycardia, perhaps tremor, cough and poor expansion. He finds among them hyperthyroidism, debility with chronic bronchitis, bronchitis with shell shock, excessive use of tobacco. He distinguishes another group whose physical signs and X-ray plates demonstrate old tuberculous lesions now perfectly quiescent who have now no evidence of active tuberculosis, but suffer from a non-tuberculous and rather chronic bronchitis. Another group with emphysema and winter bronchitis, who show definite old apical changes, have come through strenuous months in France, with its rain and wind, without any reactivity of their old tuberculosis. That is, he makes a difficult but very proper diagnosis of acute non-tuberculous activity in a lung in which there are signs of old, quiescent tuberculosis.

The *Boston Medical and Surgical Journal* (15) in a recent editorial, classes negative suspects as having pleurisy, bronchitis, trench coryza, dyspepsia, mitral stenosis, simple fatigue of body and mind, while others are simply shamming. There is scarcely a sign or a symptom of pulmonary tuberculosis which may not also be a symptom of some non-tuberculous condition. Fraenkel, quoted by Tachau (13), considers the

more fruitful sources of error in diagnosis to be an over-estimating of minor diseases such as influenza, uncertain physical examination and an anxiety to detect very early forms of disease, an incomplete and ambiguous history, and an overestimation of the importance of slight variations in temperature.

It would carry us too far afield to begin a discussion of the various signs and symptoms and their relative importance in diagnosis. An easy-going generation seeks after a sign by which diagnosis can be made automatic. The finding of bacilli may be such a sign, but it appears only in clear cases, as a rule, in which no sign is needed. Tuberculin and other tests, and even a stereoscopic X-ray plate make no automatic diagnoses. They merely add to the evidence from which a diagnosis can be made.

Under any circumstances, and at any time, distinguishing between very early tuberculosis and non-tuberculous conditions is a matter of considerable difficulty. After all evidence available has been gathered, there must be careful and judicial sifting out and weighing, and by no means at our disposal can we altogether avoid the rather unsatisfactory Scotch verdict of "Not Proven." Along the borderline, there must always be cases of doubtful diagnosis. "Wait and see," a good reliable method of clearing up difficulties in time of peace, is not always available in time of war.

There is no one absolute diagnostic sign except the demonstration of tubercle bacilli, though a summation of the evidence of signs, symptoms, and, still more important, of history, approaches in certainty even to the presence of bacilli.

With all advances that have been made, even after Laennec and Koch, the best evidence in a doubtful case, evidence which, though limited by his medical horizon, was open to Hippocrates, as to ourselves, is a carefully taken history of the case. It is the evidence very often least carefuly taken and least esteemed, and we all are inclined to ask from newer methods a diagnosis which lies waiting for us in the plain history.

There has been considerable discussion as to the usefulness or uselessness in war of a man with present or past tuberculosis. Two opposite views are strongly held. On the one hand, Sims-Woodhead and Varrier-Jones (16) consider that "Whatever may have been opinions prevailing at the beginning of the war as to the effects of campaigning on a tuberculous subject, it has now been driven home very forcibly that men suffering from pulmonary tuberculosis can be of little use in the army;

after a longer or shorter time, they almost invariably break down and soon pass beyond all hope of repair." And Bushnell (12) on the other hand adduces evidence to prove that "Military service is beneficial rather than the reverse for men with old arrested lesions,—many such have made excellent soldiers. . . . . Men with old cirrhotic forms can under certain conditions, be regarded as fit for military service." Again,—"I am especially optimistic with regard to the effect of army life on those who present evidences of old slight healed tuberculosis." Fishberg (17) goes much further and considers that "Only symptoms of active disease, especially fever, tachycardia, dyspnoea, emaciation, excessive cough and expectoration, should be considered causes for rejection." While they will scarcely take as definite a stand as Fishberg, Schroeder (4), Grau (9), and the German authors quoted by them, with many others quoted by Fishberg, consider that many tuberculous persons can and should do some military duty.

For my own part, I consider that one who has at any past time reached the anatomically advanced or moderately advanced stage, or who, in the past three or four years has had positive signs of even slight active disease, even with apparently complete recovery, would be well advised to find his war work outside of the army, and the army would be well advised to refuse the services of such a man, however willing he might be to serve. On the other hand, one whose disease was never open or was slight and attended by slight symptoms, or one in whose case there may have been or even may be in looking back upon it, a reasonable doubt of diagnosis, who has reached and held a condition of arrest and tested it out by work, such a one should not in his disease seek shelter and sanctuary from the thrusts of war. He should not be released from responsibility but should be accepted for service and even compelled to report for suitable service in home or working battalions. Indeed, after a probationary period at such service, I cannot see why he should not be advanced to active duty in the presence of the enemy, to bear his share of danger and sacrifice—and honor.

We still suffer more or less from tuberculophobia. Whatever disabilities of other sorts a man may have, we carefully estimate his capacity for further service, but if he has merely a suspicion of having had, or being about to have tuberculosis, automatically he is dropped. It is bad enough that a tuberculosis suspect should be branded with the white plague. Let us see that he is not also decorated with the white feather. By all means, let us keep those with active and real tuberculosis out of

the army, but let us keep those who are non-tuberculous and fit for service *in* the army; and let those with slight, cured, or scarcely more than theoretical or imaginary tuberculosis be not exempt from service.

The need of accurate diagnosis was never greater than now. Treatment given more or less unnecessarily to a number of patients in time of peace is a small matter, but in time of war, it is necessary to decide rigidly as to the fit-for-service and the unfit; as to those whose disability is partial or total, temporary or permanent; as to those who need or do not need sanatorium treatment; as to the length of treatment required; as to those who need investigation of sinuses rather than sanatorium care; as to whether we are dealing with chronic or acute bronchitis or real tuberculosis.

Even in the ghastly grinding of the mills of war, may there not be, indeed are there not, by-products of permanent benefit? Such by-products are the new spirit of loyalty to our country and its ideals; the spirit of self-sacrifice; the use of economy which may become a habit; the elimination of waste; the conservation of resources; the increase of national and personal efficiency. And out of war tuberculosis and its problems may come a better and clearer understanding of the disease; more accurate diagnosis; a more general resort to treatment in early cases; more and better equipped institutions for treatment; a juster idea of the place of the tuberculous man in the community and a fuller utilization of the by no means inconsiderable capacity of even the definitely tuberculous man for service

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# TUBERCULOSIS AND THE SOLDIER

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The problem of tuberculosis is important in any phase of medicine and it is small wonder that there has been much discussion as to the part it should play in the decision as to whether or not a man should be accepted for active service. The discussion has been much confused by the dragging in of side issues. The men who are advocates of taking all but active cases into the army are very fond of referring to the difficulty of deciding whether men have or have not tuberculosis. That there are difficulties in diagnosis is perfectly true but this is no argument for indiscriminate accepting any more than for indiscriminate rejection. It is difficult to diagnose a brain tumor on occasion but that would hardly be a reason for arguing that a man who possibly had a brain tumor should be accepted for service. There is usually not much difficulty in deciding when a man has had tuberculosis in the past. There is often great difculty in deciding whether a man has it at present. No one can deny that, but one important question is: should we regard the suspicion—if one exists—as of importance or not? In other words where there is a suspicion of tuberculosis in which direction should the burden of proof rest? Should we accept the man unless he shows positive signs, or hesitate to accept him unless we are reasonably sure that he is free from the disease?

One comment should be made before proceeding to any discussion of a subject connected with military medicine. There is and will be much discussion of medical and surgical war problems and vastly different views will be expressed on many subjects. Let us remember that all may be correct in expressing the side from which the problem is seen. The man in a casualty clearing station, the one in a base hospital in France, and the one in a hospital in England or Canada or the United States see very different phases of the work and have separate problems to solve. They may have widely divergent views about what is apparently the same question; in reality it is often another side of it entirely.

What I have to say on tuberculosis in the soldier is based on my experience as officer in charge of the medical division in a Canadian Military Hospital in England. This hospital admitted Imperial, Australian, and Canadian troops, but the question of tuberculosis concerned Canadians particularly as many doubtful cases were sent to this hospital for diagnosis. The decision regarding Canadian troops was particularly important as it involved their being sent back to Canada. The facilities were excellent for keeping the patients under the best conditions. One ward was kept for those in whom the diagnosis was positive until they could be sent back to Canada and one ward was for suspects. There were large covered porches accommodating about 100 beds so that positive and suspected patients were in the open air all the time.

One view of the question is given in the *Journal of the American Medical Association* of June 16, 1917, in an article on "Tuberculosis and War." With the views expressed in it I might have been in agreement from reading about the question. Since having met some of the problems in the flesh, so to say, my opinions are different, and perhaps a statement as to the dfficulties which are met among the troops in service may be of value. In the article mentioned the question is asked: "While examining recruits for the army and navy, the problem arises at once: Should all who show signs of pulmonary disease be rejected?" Exactly what is meant by pulmonary disease is not stated, but as the article is concerned with tuberculosis it may be inferred that pulmonary tuberculosis is intended. To this question, I should answer most decidedly, "Yes." My view is that signs of *any* pulmonary disease should justify rejection. The men with chronic bronchitis and emphysema are poor material for front line work. To the second question: "Is active service in the field liable to wake up dormant tuberculous lesions?" I should say, "Yes," with emphasis. As to question three: "Are soldiers and sailors excessively exposed to tuberculous infection?" I do not know as to sailors, but as to soldiers there is often much crowding in dugouts and billets and it would seem probable that they are exposed to some extent but perhaps not excessively. We know that there is no agreement as to the question of adult infection. I saw a good many men with advanced tuberculous disease and many bacilli in the sputum who had been in the trenches a few days before, and who must have been distributing bacilli for months. They were mostly of the type that refuses "to give in," and in fact some of them had only left the front when compelled to by wounds. To live in close contact with persons with advanced dis-

ease—especially when they have no means of proper disposal of sputum —is regarded as dangerous in civil life. Why not in military life? True, part of the life is in the open, but in bad weather especially they are in crowded quarters. Would any of us be comfortable if we had to live in close quarters with men who had active pulmonary tuberculosis and many bacilli in the sputum? So far as we could judge from the histories of some of these men the disease must have advanced rapidly at the front.

There are no figures available and will not be for some time as to the total number of cases of tuberculosis in the army. Any comparison with civil life on this basis is impossible at present. This article is based only on impressions, but they are gained from observations made at the opposite end of the journey which the recruit begins. One point may be mentioned, the incidence of tuberculosis among the men in the forestry and labor battalions. They seemed to show a relatively greater prevalence. Naturally for these men the examination on enlistment had been much less severe and thorough. The previous history of many of the men in these labor corps was gone into carefully and, so far as this showed, in the majority there was no evidence that they had symptoms of tuberculosis before enlisting. It would seem more reasonable to suppose that many had latent or old lesions at the time of enlistment rather than to suppose that they had contracted a fresh infection. This seems to suggest the wisdom of rejecting men who show any signs of previous trouble. It does not seem likely that men in the labor battalions would be any more exposed to infection than men in the lines. On the contrary they should be exposed very much less.

How many adults have the possibility of manifesting acute tuberculosis under certain conditions we do not know. However, a very important bit of evidence bearing on this is given by Colonel Bushnell (1) who states that among 5945 soldiers who had measles, nearly 3 per cent have developed active tuberculosis. In how many in addition a slow chronic process has begun we have no knowledge. When we consider the strain and anxiety of life in the trenches, the exposure, fatigue and loss of sleep, and the frequent bronchial infections, will it be surprising if a certain number are like the poor chaps who have had measles with a resulting lighting up of tuberculosis? An intensive study of the past history in these patients with tuberculosis after measles and a report of the physical findings on enlistment should be of interest.

But to come more particularly to the question of tuberculosis in the soldier on active service. The physicians in the base hospitals must be prepared for much more difficult problems in diagnosing tuberculosis than they have had in civil life. We all know the difficulty in some cases in deciding in a civil hospital as to whether a man has tuberculosis or not. If a man has five such cases in his clinic at one time he is impressed by it but if you had fifty such doubtful cases in any general clinic there would be much work in prospect. Such is a common experience in some base hospitals. Then there is another difference. In civil life you can wait and observe, but in military work this is not possible. You must decide quickly for beds are precious and cannot be occupied for a long period by doubtful cases. If the man is tuberculous he should be sent home at once; if he is not tuberculous you make a mistake from the point of view of the army if he is invalided home. The American and Canadian problems are much the same; a man has to be sent home—a long journey—if he is tuberculous. If not tuberculous a heavy expense is entailed if he is sent home unnecessarily. Each man costs much to train and send overseas. It is evident that to send men over who are "doubtful" in this regard is a handicap in every way. Then too there is the pension question. If you accept a man for the army, and on active service he is found to have tuberculosis, he justly receives a pension and has the right to be given care as long as is necessary. Canada is finding how expensive the returned tuberculous soldier is, both for his own care and for the support of his dependents. If you accept men who have had tuberculosis you are harming them and adding to the burden after the war.

Then there are important differences in many of the factors on which we depend to make a diagnosis. In some ways one feels that tuberculosis in the soldier from the trenches is clinically a very different disease than in civil life. Some of the points are worthy of discussion in detail.

*1. Loss of weight.* Of much importance in the diagnosis in ordinary life, in the soldier it has very little meaning, for the great majority of all who come to a base hospital have lost weight. This includes men with all sorts of conditions, acute and chronic, and, therefore, no importance can be attached to loss of weight in the diagnosis of tuberculosis. Many men who come in with acute conditions—gas poisoning for instance—have lost 20 or 30 pounds at the front.

2. *Cough.* This is an important symptom or sign—as you prefer—in suggesting the possibility of tuberculosis; but bronchitis is very common

in the soldier even in the summer, and many patients have it with other conditions. Many of the surgical patients—with wounds—had a severe bronchitis and cough even in the warm months. The majority of the suspected tuberculous patients had cough for varying periods. It is not necessary to point out how much this adds to the difficulty in a diagnosis of tuberculosis. The bronchitis is very persistent and a chronic cough is common among all classes.

3. *Bloody sputum.* A note of this occurs very frequently in the histories of patients with all kinds of pulmonary and bronchial infections and it is found in a strikingly large proportion of the bronchitis patients. I do not refer to frank hemorrhages, but to small quantities and streaks of blood. Several patients under observation brought up bloody sputum off and on for some time, with a bronchitis which so far as we could determine was not tuberculous. The difficulty in diagnosis which this entails is very evident.

4. *Pleurisy.* In civil life a pleurisy coming on without other explanation is properly held under suspicion as being tuberculous. If this rule applies to the soldier then there is a great deal more tuberculosis than is realized, for pleurisy is frequent. Some are undoubtedly tuberculous but many are probably not. The study of these cases suggested that the pneumococcus was often responsible. The relatively increased frequency seemed to be about equal between the acute fibrinous form and that with serous effusion.

5. *Fever.* We would all agree as to the importance of this in the usual diagnosis of tuberculosis. In the soldier it is deceptive in two ways. In the first place many of the men have slight fever for which one can find no cause. The army surgeon will meet a condition called "trench fever." He will meet it in the patient in a well defined form but he will meet it also on the diagnosis card, used much as "rheumatism" is to cover ignorance. The common bronchitis often has fever which may continue for some time. On the other hand he will discover that many of the tuberculous patients do not have any fever. It was surprising to find how many patients had no fever when the tuberculous lesions were well marked and evidently active. This seemed much more common than in civil life. One can theorize as to the reasons.

6. *Pulse rate.* Important in ordinary life, in the military hospital it does not have any significance. Increased pulse rate is very common, often very variable and cannot be depended upon as a sign of any value in the early stage of tuberculosis. The effect of exertion on the pulse

rate is of no value in this connection. Increase in the rate is very common in many patients with all sorts of diseases. The effect of war on the nervous system runs through everything.

*7. General condition.* This is of little value as so many of the patients are "used up" generally. The strain of the life in the front lines has affected them in many ways.

*8. Progress.* Here again we are in difficulty. Men come to the hospital suspected of being tuberculous and are kept out of doors constantly. In the hospital in which the writer worked there were special wards with large open air porches where the men were out of doors all the time, so that the living conditions were good and the men were well fed. Under these circumstances a man who has bronchitis only or a tuberculous lesion not sufficient to be easily recognized should do well. Many of them did not, and, in place of gaining, lost weight. Should this count in favor of tuberculosis? In civil life one would say yes but here one is doubtful. A number of these patients ultimately cleared up and so far as the diagnosis could be positive were not tuberculous.

*9. Tuberculin and X-rays.* The use of the former does not differ from that in civil work, but in the latter the difficulties seem greater. My impression is that a large proportion of soldiers show very marked shadows —especially radiating from the root of the lung. It may be that these are due to the marked prevalence of bronchitis. Many of these men had been in active service for some time and had many attacks of bronchitis. The X-ray staff did all they could to help, but they are usually overworked and the examination of the wounded naturally takes first place. The difficulties of X-ray diagnosis are well recognized.

Consider the problem often presented. A soldier comes with a history of cough, bloody sputum, loss of weight and general malaise. On examination he has fever, cough, bloody sputum, a rapid pulse and is emaciated. The examination shows slightly less expansion at one apex, dulness on percussion, and on auscultation loud râles throughout, so loud perhaps that any fine crackling râles which may be at an apex are quite obscured. The examination of the sputum does not show any tubercle bacilli. A skin tuberculin test is positive; a subcutaneous test is perhaps not possible on account of fever. The X-ray examination shows increased shadows which are probably more marked at the affected apex. What diagnosis would you make in such a case? There is no question as to the existence of an old lesion. Is there a lighting up of the old tuberculous process or is it only an old quiescent lesion with an

acute bronchitis? This was a not infrequent picture, and one which gave much concern to the medical officers. The more men with old lesions you admit to the army the more of such cases there will be for decision. Some men have said, "Do not regard them as tuberculous until tubercle bacilli are found in the sputum," but the error in this advice is evident. To send a man with tuberculosis but without bacilli in the sputum back to the trench life would be criminal.

The article referred to in the early part of this paper states that "chronic bronchitis, pulmonary emphysema, asthma, bronchiectasis, etc., if the heart is found in good condition, and there are no disabling symptoms, such as dyspnoea, tachycardia, loss of weight, etc., should also not be considered causes for rejection from military duty." No one can say how many men with these conditions are serving at the front, but if the writer of this opinion could see the amount of work given to the medical department because men with such conditions have been accepted, my feeling is that he would at the least seriously reconsider his opinion. Asthma particularly should be considered a very important matter in the decision as to the acceptance of a recruit. There were an unusual number of patients with asthma coming back from the front, somehaving it for the first time, others giving a history of its being a recurrence. The common bronchitis undoubtedly has much to do with causing a lighting up of the process. Army life seems to light up asthma as it does epilepsy. Chronic bronchitis should be regarded as a cause for rejection. Such men may be useful in base duty but they do not seem suitable for front line duty either in fairness to the army or to themselves.

It was stated recently, by an officer who should know, that of a certain number of men returned from France as tuberculous or suspected of being tuberculous more than half were found not to have tuberculosis. Possibly this statement may have suggested to some that the medical officers who sent them back did not know their work very well. If such critics had been in the position of having to decide the disposal of these men they would have a different opinion. There is going to be great difficulty in making the diagnosis of tuberculosis in the soldier, and this seems to be one argument in favor of rejecting men who show signs of previous trouble. Accept them and you are setting in train a series of events which may only end many years ahead when the last pension is paid.

In all discussion regarding tuberculosis and the soldier regard must be had to the class in which he is placed. There are many occupations

behind the lines with less exposure and in which the risks to a tuberculous individual are much less than in the trenches. But as regards full military duty, for the sake of the army, military and medical efficiency and the man himself, previous tuberculosis and also any reasonable suspicion of an early lesion should be regarded as a cause for rejection.

REFERENCE

(1) BUSHNELL, G. E.: J. A. M. A., 1918, lxx, 1821.

# PAIN IN THE CHEST WITH SPECIAL REFERENCE TO PULMONARY TUBERCULOSIS

JOHN B. HAWES, 2nd.

*Boston*

During the past year, both at my clinic at the Massachusetts General Hospital and in private practice, I have been impressed with the number of patients with various forms of pulmonary tuberculosis, active, inactive, acute, and chronic, whose chief complaint was pain in the chest. This has varied from sharp, shooting, knife-like pains, definitely localized, to a fairly continuous, dull ache which the patient found hard to place exactly but was usually between the shoulder blades or under the sternum. It varied according to weather conditions and in other ways. Patient after patient has come in, not because they were losing weight or strength, not because of excessive cough or sputum or of hemorrhage, but because of this pain. Many of these patients were in excellent condition, in the very early and incipient stages, and many were chronic, inactive cases. I cannot make out that this pain occurred more frequently in one class than in another. Among the Hebrew patients symptoms were usually more marked, but I have found it frequently in all classes and types of people, so much so, that I am very sure that it is a real and genuine cause for complaint, and not a neurotic phenomenon.

In very few cases have I been able to explain the cause of this pain, to my own satisfaction at least. I, and I presume other physicians say the same thing, have been accustomed to say that it was due to a contraction of scar tissue and was rather a favorable sign that healing was going on. This seems to fill the bill very well in incipient and favorable cases. To those patients with more active disease I usually say that there must be a bit of pleurisy which will soon quiet down, or that it is a touch of rheumatism, muscular or otherwise. This again seems to satisfy the patient and apparently does no harm, but it certainly does not satisfy me. I have now come to the conclusion that the best way is to tell the patient that I do not know the cause of this pain, but that in the great majority of cases it is not a bad sign but that it is something

that neither the patient nor the physician can affect to any great extent. I have investigated this subject and brought it up for discussion in the hope that some light may be thrown on what to me is a difficult clinical problem.

In order to obtain some material on which to work, I have asked a series of questions of 450 patients in our state sanatoria. While I realize perfectly well that the replies to my questions on this subject from such a source as this, where many of those who answered were of limited intelligence, furnish little or no scientific data from which accurate conclusions may be drawn, I do feel that the evidence presented by these 450 patients on a subject which intimately concerns their comfort, if not welfare, is at least of interest.

Of the 450 patients to whom I sent my list of questions, 73 stated that they had never had any pain in the chest, while the remaining 377 some time or other suffered more or less in this way. To the next question, as to how many had ever had pleurisy, 298 replied in the affirmative. Thus, out of these 450 patients, 377 had experienced pain in the chest, and 298 attributed this pain to pleurisy or what they thought was pleurisy.

To confirm this statement in regard to pleurisy, I asked each patient whether the pain was caused or increased by coughing, deep breathing or by both, and to my surprise found that only 73 suffered pain on coughing, 74 on breathing, and 56 on both coughing and breathing. This would lead me to believe that patients are apt to attribute any pain in the chest to pleurisy, but that this pain is by no means always due to pleurisy.

The answers in regard to the relation of this pain to weather conditions were of interest. One hundred and fifty-eight stated that their pain was in no way affected by weather conditions; 138 stated that certain weather conditions made the pain worse but did not specify what variety of weather had this effect; 80 stated that damp, cold, windy weather made the pain worse, and only 1 that warm weather increased the pain.

In regard to the effect of special movements or position, 276 said that neither movements nor any special position had anything to do with the pain, while 101 said that undue activity, walking, stooping, or bending over increased the pain. Somewhat to my surprise, 24 said the pain was made worse by lying down, while a few frank souls admitted that work of any kind made the pain worse. In regard to eating, there was a

unanimity of opinion that eating had little to do with the pain. Three hundred and fifty-five said, "No," and only 22, "Yes," to this question. As to the time when the pain was most in evidence, 55 said it was worse during the day, 43 during the night, while 279 stated that there was no special time when the pain occurred. About one-half of the patients described the pain as a continuous, dull ache, while the other half said that it came in short, sharp attacks. Twenty-two patients admitted that they did not mind the pain itself, that it was only slight, but that it worried them because they felt that their disease was becoming more active.

So far in this investigation, I do not feel that I have gleaned very much of value concerning thoracic pain, and yet, as I said before, it is certainly a very real and genuine thing. My medical friends who have themselves had tuberculosis and with whom I have talked on this subject, speak very strongly in regard to it. One writes as follows: "I can speak with a full heart about thoracic pain, neck pain, back pain, and acromial pain in pulmonary tuberculosis. It was the leading symptom with me for ten years before my disease manifested itself frankly."

In brief, from my replies to the letters I wrote to these 450 patients concerning thoracic pain, I can conclude that 377 had suffered from pain in the chest at some time or other; that out of these, 298 attributed this to pleurisy; less than half of these patients stated that the pain was made worse by coughing, deep breathing, or both; there were 138 patients who said the pain was made worse by weather conditions, usually cold and dampness; 101 who said undue activity or certain special motions brought on the pain; only 22 could see any connection between eating and digestive disturbances and the thoracic pain, and there were only comparatively few who stated that the pain was worse during the night or during the day or at any special time.

The pain in the chest associated with eating or following eating might well have been due to heartburn, gas, hyperacidity, etc. It is of little or no importance here, and is usually easily controlled. The pain on motion or undue or unusual exertion can usually be explained by faulty posture or some mild form of infectious or toxic arthritis. This, however, is not a satisfactory explanation, except in a few instances. That the pain is worse on cold, damp, windy days may or may not be of some significance. Pleurisy, acute or chronic, undoubtedly causes pain in a fairly large proportion of cases, while the shrinking and contraction of fibrous tissue is probably the case in a still larger number.

Miller (1) in a recent article, discusses the nerves and ganglia of the lungs and their condition, as found on pathological examination of a case of acute pulmonary tuberculosis. His remarks on the subject are of interest in this connection, and I quote freely from his paper:

Distribution of the nerves and ganglia (in a tubercular lung) differ in no respect from the normal. Tuberculosis does not occasion an increase in the number of nerves or ganglia in the lung. . . . . The lungs receive their nerve supply from the pneumogastric nerve reinforced by branches from the second, third, and sometimes the fourth thoracic ganglia of the sympathetic. . . . . These follow the bronchi throughout their course, diminishing in size with the diminishing calibre of the bronchi. . . . . In many places not only these nerves but also the main nerve trunks are highly inflamed, being surrounded by and infiltrated with a large number of lymphocytes. . . . . Ganglia were found surrounded by and infiltrated with lymphocytes, showing that they, as well as the nerves, were involved in the general inflammatory process.

Finally, he asks the following question: "May not the irritating and productive cough in some cases of tuberculosis and the dry hacking cough in other cases be due to nerve irritation?" To this I would add the following question: May not this pain in the chest that does not appear to be due to pleurisy, posture, eating, etc., be connected with the highly inflamed and irritated condition of the nerves and ganglia involved in the tubercular process?

As far as relieving the pain is concerned, I have little to offer. I have used aspirin, salicylates, bromides, and other sedatives and analgesics, menthol and other ointments, cold and hot packs, and strapping, with varying success or usually the lack of it. I find that what helps these patients more than anything else is to explain to them in detail that a certain amount of thoracic pain is to be expected and is a necessary accompaniment of the disease; that it is not necessarily an unfavorable symptom, but that, in my opinion at least, in many instances it is a favorable sign. This form of reassurance, or psychotherapy, if one wishes to call it such, seems to do more good than anything else.

## REFERENCE

(1) MILLER, W. S.: A study of the nerves and ganglia of the lung in a case of pulmonary tuberculosis. Am. Rev. Tub., ii, 123.

# MEDICAL NOTES, ABSTRACTS AND REVIEWS

It will be the eventual purpose of the REVIEW thoroughly to canvass all literature on tuberculosis as it appears in other medical periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the Abstract Editor, Dr. George Mannheimer, 41 West 51st Street, New York, N. Y.

**Tuberculosis and the War.**—The experience of England and Wales with respect to tuberculosis during the past few years is practically identical with that of the continental countries engaged in the war, namely, that the disease has increased both in prevalence and in fatality. The following table accompanies an article on this subject by Newsholme, published in a recent number of *The Lancet*. The table shows that, comparing the experience of 1913, the last complete year before the war, with subsequent years, the deaths from pulmonary tuberculosis increased by 1582 in the year 1914, by 4,621 in 1915, and by 4490 in 1916, the third year of the war.

| YEAR | DEATHS FROM PULMONARY TUBERCULOSIS | | | DEATHS FROM OTHER FORMS OF TUBERCULOSIS | | | DEATHS OF PERSONS FROM | | |
|---|---|---|---|---|---|---|---|---|---|
| | Males | Females | Total | Males | Females | Totals | Pneumonia | Bronchitis | Influenza |
| 1911 | 21,985 | 17,247 | 39,232 | 7,242 | 6,646 | 13,888 | 37,642 | 36,555 | 4,343 |
| 1912 | 21,568 | 16,515 | 38,083 | 6,238 | 5,730 | 11,968 | 37,348 | 39,733 | 5,354 |
| 1913 | 21,034 | 16,021 | 37,055 | 6,623 | 5,798 | 12,421 | 37,530 | 39,227 | 6,394 |
| 1914 | 21,812 | 16,825 | 38,637 | 6,264 | 5,397 | 11,661 | 40,070 | 40,189 | 5,964 |
| 1915 | 23,630 | 18,046 | 41,676 | 6,715 | 5,904 | 12,619 | 48,874 | 50,974 | 10,484 |
| 1916 | 23,238 | 18,307 | 41,545 | 6,488 | 5,825 | 12,313 | 37,916 | 43,412 | 8,791 |

In commenting on the increased mortality shown in this table, Newsholme says: "Men in the army and men and women in industrial employment, notwithstanding the efforts to minimize these results, have been exposed to conditions leading to the spread of tuberculosis and to the calling into activity of latent disease. A large number of unrecognized or partially recovered consumptives have entered the army or have been employed at high wages in munition and other works. In many instances there have been overwork and excessive exposure to irritating dust. Commonly, also, owing to great migrations of military and civil population, there has been overcrowding under conditions unfavorable to health. These are the outstanding facts. They will need to be further considered in the light of the current year's experience.

The experience in this country appears to coincide with that of the continental countries engaged in the present war. In all of them, so far as can be gathered from official information, tuberculosis appears to have been more rife and more fatal than prior to the war. It is proper to state that this unfavorable record would almost certainly have been worse but for the organized efforts to improve housing conditions in areas the population of which has been swollen by war work, and especially for the efforts made by the Government to secure improved conditions of work for munition workers, as well as to cope with the special housing difficulties which have arisen. I may draw attention, furthermore, to the fact that notwithstanding the increase in the population of England and Wales in the interval, the deaths from pulmonary tuberculosis were fewer than in so recent a year as 1902.—*Weekly Bull., Dept. of Health, City of N. Y., December 29, 1917, vi, No. 52.*

**The American Soldier and Tuberculosis.**—In a paper read before the American Public Health Association S. A. Knopf gives a concise and thorough outline of the disease tuberculosis. The nature, causes, transmission and methods of prevention of tuberculosis are summarized in the form of questions and answers, designed to give the soldier the indispensable knowledge which will prevent him from contracting the disease, and teaches him to conduct himself hygienically in camps, billets, dugouts and trenches. The paper is published in pam-

phlet form authorized by the Surgeon General of the U. S. Army; it is also translated into French.

Emphasis is laid on the communicability of tuberculosis, and the explanation is given that a tuberculous patient is no danger to a healthy individual and can be associated with provided he takes care of his expectoration properly. A floor cuspidor is described and illustrated. It is made of metal, has a large opening with a cover which opens by pressing with a foot on a pedal, and the cuspidor is filled with saw-dust or water. A few varieties of pocket sputum cups are also described and illustrated. When these are not available pieces of cloth should be used for collecting sputum. These are then burned. Not only the tuberculous soldier is cautioned against the careless disposal of sputum, but even those suffering from ordinary colds. The hands should be washed before touching food whenever possible. The early symptoms of pulmonary tuberculosis are enumerated and the soldier is advised, whenever he has a cough with expectoration, to report to the surgeon for examination and bring his sputum. The factors which render an individual susceptible to the disease are described and the soldier is instructed how to keep himself in good condition so that he may not become susceptible. The importance of fresh air in camps, billet, and dugout is emphasized. Breathing exercises in the open should be taken as often as possible, particularly when the air in dug-outs and trenches is vitiated. A simple method is to inhale deeply, raising the shoulders during the act of inhalation, moving them backward and remaining in that position for about six seconds; then exhale a trifle more quickly by moving the shoulders forward and downward. This is done six to eight times; is repeated every hour or half hour. The predisposition to tuberculosis is acquired by the lowering of the general health through intercurrent infections, lack of proper food, air and sunlight, through insufficient clothing, prolonged inhalation of irritating substances, over-fatigue, lack of sleep, over-indulgence in tobacco and the use of alcoholic drinks. The soldier is advised not to smoke much and if not a smoker, to avoid contracting the habit. Those recently recovered from any other disease should avoid prolonged contact with tuberculous individuals. In general the American soldier in France need not fear contracting tuberculosis if he adhere to the rules given. The early training in the love of fresh air and the use of cold water on his body have made the American more resistant to the disease than his French comrade, and the thorough weeding out of those strongly predisposed or already afflicted with the disease will limit the spread of tuberculosis among our soldiers to a relatively small number. Those who unfortunately will be stricken, will be properly cared for by any of the large number of institutions upon return to the United States. —*What the American Soldier Now Fighting in France Should Know About Tuberculosis, S. A. Knopf, Med. Rec., November 3, xcii, No. 18.*

**Tuberculosis and the Army.**—Stations have been established by the Health Department of the French Army for the purpose: 1. Of eliminating definitely and rapidly cases of pulmonary tuberculosis; 2. Of returning to the various units the greatest number possible of non-tuberculous. At these stations all suspects are received. The present study comprises the results of 1000 cases examined at one of these stations. The reason for suspicion in these cases were functional troubles (cough, dyspnoea, etc.) general symptoms (fever, loss of weight, etc.) or physical signs usually associated with pulmonary disease. Physical examination and careful history, radioscopic examination, and examination of nose, throat, and ears were the chief guides in sorting out the cases. Examination of the sputum was made in every case. Of the first 1000 cases examined 694 were non-tuberculous, 113 were referred to nose and throat specialists and 193 or about 20 per cent were definitely tuberculous. The authors call attention to the importance of conditions of nose and throat as a cause of signs in the lungs. In the 694 cases called not tuberculous there were cases of acute bronchitis, chronic bronchitis, emphysema, pleurisies, cardiac lesions, etc. In addition to these there was an interesting series of apical lesions without any radiographic findings and others who showed radioscopically evidences of old and healed apical lesions. The authors admit that some early cases of tuberculosis may have slipped through their station as their methods of elimination are not perfect, but as they were all sent back to general medical stations further study would probably reveal tuberculosis, if present. A few cases of wounds of the lung and of inhalation of asphyxiating gases were also found. Of the definitely tuberculous 12 had signs of an acute bronchitis with râles predominating at the bases; 9 were generally debilitated without recognizable signs clinically or with the X-ray; others had no appreciable clinical changes in the lungs, but showed definite radioscopic shadows; the largest number had evident clinical apical lesions, and lastly there were cases with extensive disease, and some with cavities. It is noteworthy that some of

those with cavitation had been at the front since the beginning of the war and were in excellent physical condition. The importance of sputum examination consistently and carefully carried out, and also of the X-ray examination is emphasized. Lastly the authors suggest that careful records of each patient be kept and be sent along with the patient for the assistance of other medical officers under whose care the cases may come.—*Sur le triage des tuberculeux aux armées, L. Kindberg, T. A. Delhirm, Presse méd., November 15, 1917, No. 63, 645.*

**Tuberculosis Problem in Italian Army**—There are two organizations in the Italian Army, known as the Diagnostic Centers and Sanatorial Centers. The first is occupied with the task of rapidly and correctly detecting tuberculous cases. The second is charged with the care of cases of initial tuberculosis whose discharge from the army has been left undecided. The diagnostic center is really an observation hospital under the direction of a staff of especially competent diagnosticians in tuberculosis. It is equipped with the most recent and modern requirements for such work. It is the headquarters for the territory of its relative army corps and to it must be sent all recruits having a tuberculous history or the appearance of relics of conditions which are suspicious in this connection. The suspect is retained there only for such time as may be necessary for the completion of the requisite diagnostic observation. He is then subjected to the proper measures that his case may demand—leave of absence, sanatorial treatment, or actual discharge. If he is discharged the prefect of the province from which he comes is notified. It is considered an error to say that a man has been tuberculous; a man either is or is not tuberculous. Consequently one of the most rigid measures introduced in the Italian army has been the absolute refusal at the initial physical examination of all men who had a history of a past pleurisy confirmed by other findings. This led to the introduction into the list of causes for rejection of "relics of pleurisy" when clinically ascertained. It also became manifest in course of time that the former practice of relegating such persons to sedentary duties in the army was also not practical; the best procedure being the total discharge from the army. It becomes then unnecessary to determine in a given case whether a man has an active or inactive lesion. The tuberculin test becomes then of no value, but radiological examinations are used instead at the diagnostic centers.

There are two lists of criteria to follow in the classification of suspected cases: Criteria of Certainty and Criteria of Presumption. In the first list are the following: the presence of bacilli, positive laryngeal localization, positive stethoscopic findings, or positive x-ray findings, which include broncho-pneumonia or pleurisy but not peribronchitis or adenitis only. Among the criteria of presumption we have: positive radiological examination and the presence of symptoms, or positive stethoscopic and radiologic examination, or positive radiologic results only. With criteria of certainty the man is discharged from service, while criteria of presumption render the decision uncertain. The physician may then grant a leave of absence of from four to twelve months postponing definite judgment to later observation. At the end of the furlough the man returns to the diagnostic center. If presumptive criteria are almost lacking the soldier is returned to sedentary service. In the zone of military operations there have been provided local diagnostic centers for those men who show signs of tuberculous infection. These centers are part of the local base hospitals, but are thoroughly isolated therefrom. After the presence of disease has been established or excluded the patient is disposed of. If an open case, he is discharged, if closed, he is sent to the central hospital or given a furlough.—*The Problem of Tuberculosis in Modern Armies at War, and Its Study and Solution in the Italian Armies, A. M, Caccini, Med. Rec., March 30, 1918, xciii, No. 13, 529.*

**Correctable Defects and Tuberculosis in Drafted Men.**—The draft examinations revealed many thousand of cases of early tuberculosis, not previously recognized, and a large number of other correctable defects. The article deals with the excellent and efficient method adopted by the California State Board of Health in following up and taking care of these cases.—*Correctable Defects and Tuberculosis in Drafted Men. W. A. Sawyer, J. Am. M. Ass., February 2, 1918, lxx, No. 5, 308.*

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* "The Choice of Tuberculins," by Benjamin White, Otisville, N. Y., Department of Health, City of New York. Read at the annual meeting of the Medical Society of the State of New York, at Saratoga Springs, May 18, 1916.

† Human or bovine type.

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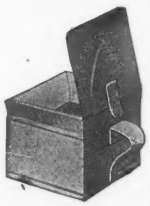

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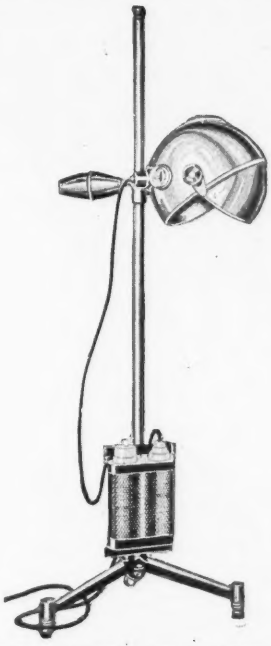

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